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HAECKEL'S

FRAUDS AND FORGERIES.



By ASSMUTH and HULL.

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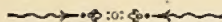
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HAECKEL'S FRAUDS AND FORGERIES.



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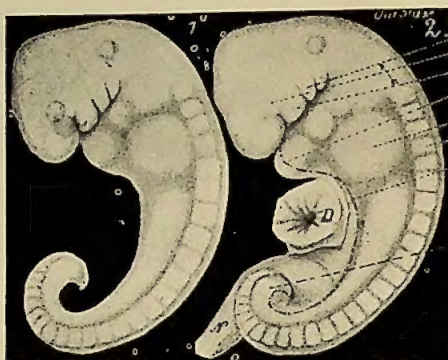


PLATE I.

SPECIMENS OF KEIBEL'S EXPOSURES.

(See page 9.)

(1) HAECKEL'S "COPY." (2) SELENKA'S ORIGINAL.



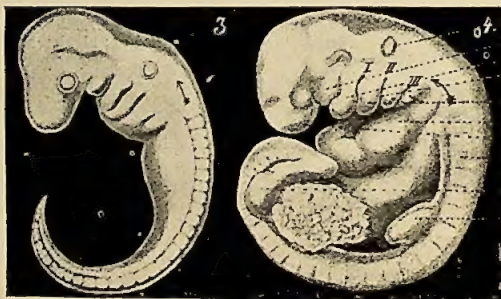
Folds
Eye
Jaws
Heart
Arm
Backbone
Line showing
what Haeckel
has cut off. }

Leg

D. Yolk-Sac
N. Navel

Haeckel takes Selenka's genuine figure of a *Macaque* embryo, cuts off such essential parts as the arms, legs, heart, navel, yolk-sac, so as to make it as much like a fish-embryo as possible, and then labels it "Embryo of a *Gibbon* in the fish-stage." Haeckel excuses himself by pretending that the omitted parts are *not* essential.

(3) HAECKEL'S "COPY." (4) HIS'S ORIGINAL.



Ear
Jaws
Folds
Heart
No-e
Backbone
Leg
Arm

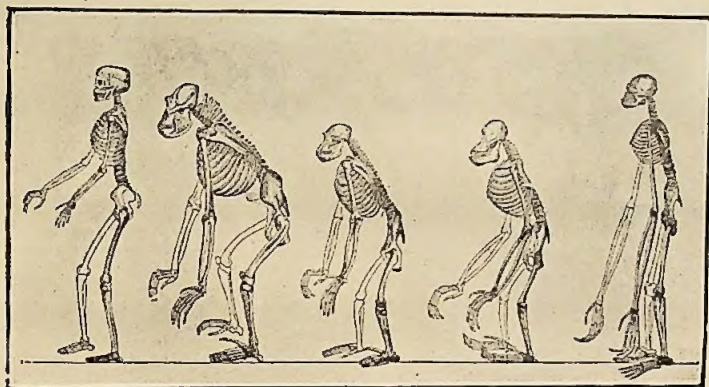
Compare the full embryo of a man, figured by His from life, with Haeckel's diminished figure. Haeckel omits such essential parts as the arms, legs, heart, so as to make it as much like a fish-embryo as possible, and then labels it "Embryo of a man in the fish-stage." This is not merely a mutilated copy, but a free invention, and is absolutely unlike the reality as observed by others.

PLATE II. SKELETONS OF APES AND OF MAN.

(See Page 85.)

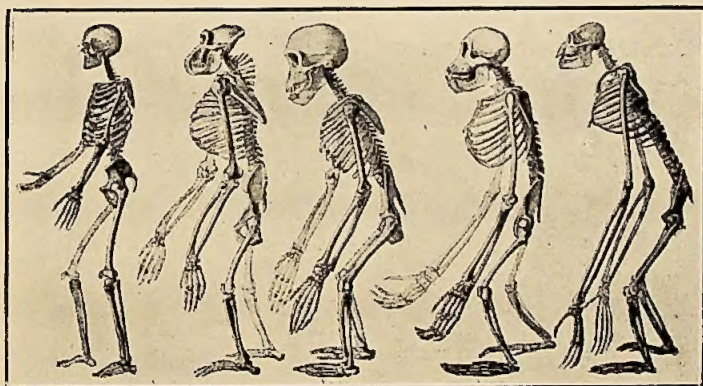
I. HUXLEY'S ORIGINAL PLATE (REVERSED.)

Man. Gorilla. Chimpanzee Orang. Gibbon.

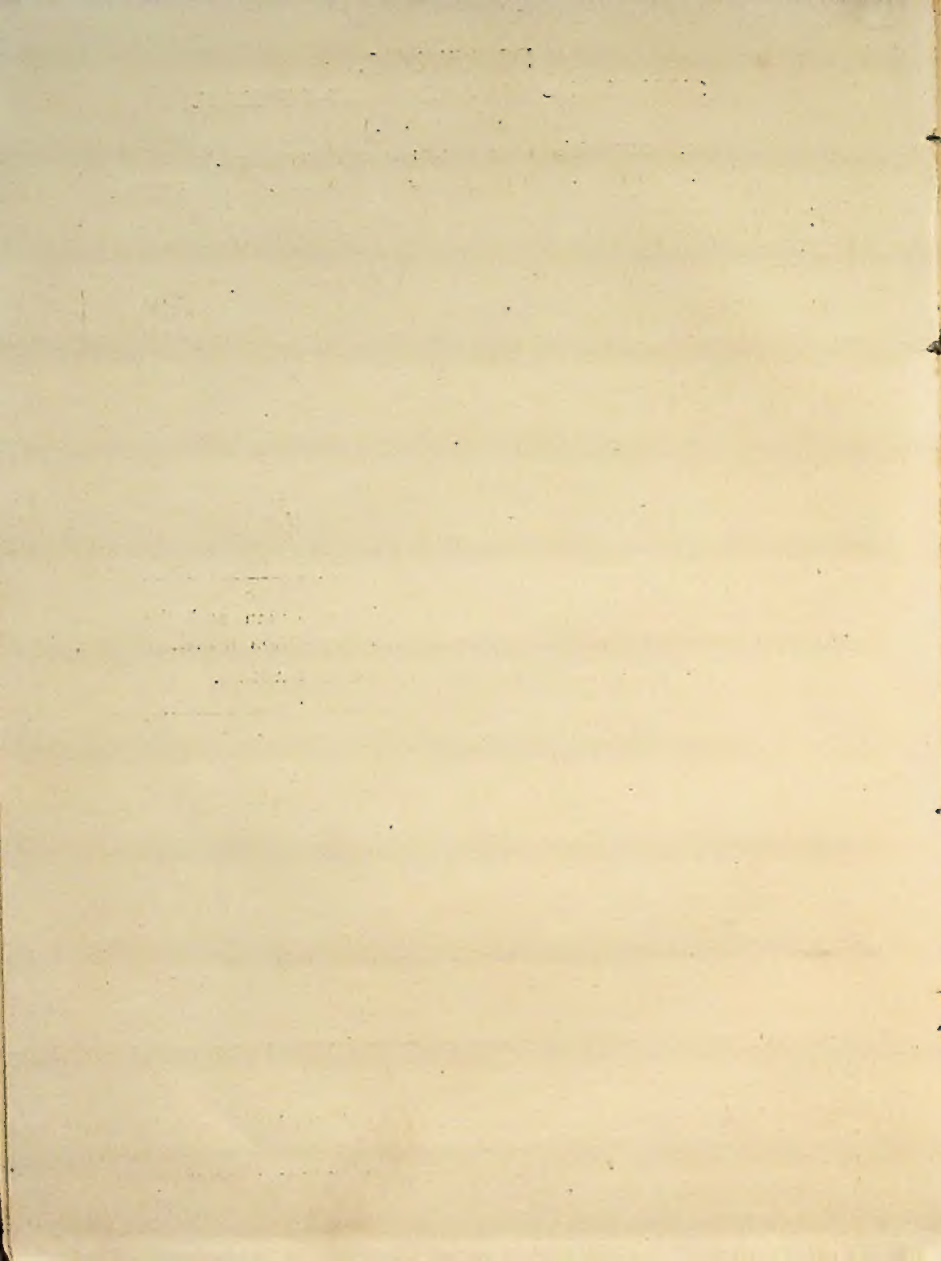


Huxley's plate displays many differences between man and the apes: e. g., the bent posture of the apes, the turned-up position of their feet, etc.

II. HAECKEL'S MODIFICATION OF THE ABOVE.



Haeckel substitutes two new figures, makes the feet of the apes flat like those of man, straightens up their backs, cuts off the neckbones of the gorilla, and creates an impression of sequence altogether untrue to nature, so as to support his theory of descent.



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Preface.

The following essay took its rise from a short article in THE EXAMINER of May 23rd, 1914, which contained a charge of complicity against the *Rationalist Press Association* for its circulation of Haeckel's popular writings; the justice of which was challenged by the Honorary Secretary of a local branch of the same Association. The whole of the matter was provided by Father J. Assmuth, S. J., of St. Xavier's College, Bombay, who had full and first-hand evidence before him. All that the Editor of THE EXAMINER had to do was to throw this matter into literary shape. The articles were published in THE EXAMINER July 11th to August 22nd, 1914. In reproducing them in book-form some repetitions, and also some allusions of purely current import have been omitted. On the other hand, many points have been strengthened by additional matter. A short appendix has been added, dealing with a pamphlet written in reply to our articles.

The incident of the challenge was highly convenient; for it drove us both to work over the subject thoroughly. As Haeckel's books are in wide circulation, and are read by a large number even of Christian readers, much to their detriment, we hope that this book will just come handily to meet a current need. A waggish correspondent suggested that its title should be "*Haeckel Heckled and the Riddle Riddled*," but we prefer to confine this suggestion to the preface. It is our intention later on to deal with the whole of Haeckel's monistic doctrine in a more direct manner; but this scheme will have to wait its turn.

ERNEST R. HULL, S. J.,

Jan. 31st, 1915.

Editor of THE EXAMINER.

THE HAECKEL CASE.

PART I.

THE THREE EXPOSURES.

IN the EXAMINER of May 23rd 1914 there appeared a "contributed" article entitled *Rationalism and Rationalistic Methods*. After defining the term "rationalism" in the words of the Rationalist Press Association, the writer went on to criticise the soundness of the rationalist standpoint, and then asked: "What are the methods used to propagate rationalistic thought?" He proceeded to answer as follows:—"The Rationalist Press Association proclaims from the housetops: 'Truth, so far as it bears on the life and aspirations of mankind, or on the universe to which common experience introduces us, belongs to all men. This (their birthright) the R. P. A. seeks to restore by making the truth of nature and science increasingly accessible to all.' Truth is the ever recurring strain. How do they propose to spread truth among all men? By the most shameless frauds and forgeries. For instance, there is E. Haeckel of Jena in Germany. The R. P. A. has made him an honorary associate, and has thrown a translation of his *Riddle of the Universe* broadcast among the people. Now Haeckel's love of truth and methods of spreading truth were made known to the world in 1908. Three times he has been convicted of forgery" . . . [here follow certain details] . . . "What can we say of his friends who praise him as 'one of the most thoughtful men of science in Europe,' and who spread his book in cheap editions all over the country in order to cheat people out of their religion? Yet such a production is advertised by the R. P. A. as 'a unique exposition, both from the philosophical and the historical point of view,

of nineteenth century thought on the central problem of life.' The rationalists cry 'Truth, Truth,' but there is no truth."

Thus far the article. Shortly afterwards we received a letter from the Honorary Secretary of a branch of the Rationalist Press Association, complaining that he considered this charge, as far as it is directed against that association, to be "highly defamatory and libelous;" and even with regard to Haeckel he questioned the soundness of the indictment, and put forward a certain counter-statement in defence. Now it is certainly not our wish to maintain in print accusations against anyone, whether an individual or a corporate body, without being quite sure that they are justified by the evidence. We have therefore decided to take up the challenge and submit the whole matter to a careful examination.

The subject divides itself into two parts: (1) What is the accusation against Haeckel, and how far is the accusation substantiated? (2) Given that it is fully substantiated, how far is the Rationalist Press Association implicated by the patronage which they extend to Haeckel's books? As point No. 1 stands altogether distinct from point No. 2, we have decided to tackle that first by itself. Desirous to obtain first-hand sources, we have enlisted the services of a German scientific professor, a Berlin Doctor in Biology, who was in Germany at the time, an eye-witness of the whole recent controversy, and is familiar with most of the literature bearing on the case. The following is the outcome of his notes on the subject:—

SOME GENERAL PRINCIPLES.

Introductory Remarks.—Any plate or illustration given without comment by an author in a scientific work can only be taken to mean a faithful representation of what the author has actually observed in the course of

his investigations, microscopic or otherwise. If the picture is borrowed from some other scientist, it must be labelled such, and must be an exact copy of the original. If a borrowed picture is in any way changed or modified, it is a universally established custom among scientists to state this in clear terms, besides indicating the original of which it is a modification. If the picture is not a representation of an object really seen, but merely an illustration of the author's view or theory, it must be so described in express terms, (e. g. "*Schematic Figure*"),* so as to prevent the reader from imagining that it represents a real object.

Similarly with regard to the written text of scientific books. Only ascertained facts must be categorically put forward as such. Theories must be clearly labelled as theories, and hypotheses as hypotheses. Moreover, nothing must be stated as universally true, if reliable authorities have put on record observations proving that the thing asserted is *not* universal. In any case the existence of investigations giving results contradictory to those put forward by the author ought to be mentioned.

The infringement of these principles, when arising from carelessness, haste, looseness of mind, or prejudice and special pleading, tends to deprive a scientific writer of all reliability. And if the infringement has been deliberate, without the foregoing excuse, it opens him to the charge of fraud or of forgery in greater or less degree, according to the degree or kind of misrepresentation, whether in plates or in text, of which he has been guilty.

* Wasmann (*Stimmen aus Maria-Laach*, Vol. 76, p. 303) defines a schematic figure as one "which is expressly intended to bring out only certain features of the object, and these in a form reconstructed according to the view of the author. The difference between 'schematic' and 'non-schematic' figures lies precisely in this: that the latter are meant to represent the object as the author has seen it, the former as he has imagined certain features of it."

That Haeckel has been guilty of the infringement of these rules, both in his plates and in the text of some of his books, has been clearly demonstrated at three different dates, viz., 1868, 1875 and 1908. In the following list, all the most important falsifications, unlawful modifications and free inventions of pictures perpetrated by him are given as far as they have been proved such by competent authorities. General statements of untruthful character, which are not bound up with particular figures or illustrations, have been omitted.

FIRST EXPOSURE—1868.

Rütimeyer vs. Haeckel.—The first edition of *The Natural History of Creation* was published in 1868. In it Haeckel stated that the ova and embryos, not only of different vertebrates, but also of man, are, at certain periods of their development, all perfectly alike. In proof of this assertion he inserted side by side on page 242 three pictures of ova labelled as those of man, monkey and dog respectively; and on page 248 three pictures of embryos, labelled as those of the dog, fowl and tortoise. The accompanying text pointed out (p. 249) that there was in neither case any difference to be discovered between the three—which everyone looking at the pictures would certainly take to be a fact. This statement caused some sensation in the ranks of the embryologists and anatomists, and soon led to an examination, the result of which was startling. L. Rütimeyer, Professor of Zoology and Comparative Anatomy at the University of Basle, proved in the *Archiv für Anthropologie* (Vol. VIII, 1868, page 300) that in each case the same identical woodcut had thrice been repeated side by side; the title underneath alone being changed.

Haeckel later on (*Anthropogeny*, 4th Ed. 1891) took notice of this accusation, acknowledged the fact, and confessed that it was "a piece of extraordinary folly."

But the confession was not accompanied with any proper amendment. He could not of course continue to issue his triple impression of the selfsame block. Nor could he produce three genuine blocks proving the identity of the three ova or embryos, because in fact they are *not* identical [see later]. What he did was to shirk the issue, and subsequently to reproduce only one copy of each incriminated block, giving to the one a single inscription, and to the other a collective inscription. For the rest, not being able to put forth any plausible excuse for his way of acting, he followed his usual course: he showered upon Prof. Rüttimeyer, a man universally esteemed as a most conscientious worker, a flood of the grossest invectives, "as untrue in their substance as ungentlemanlike in their form"—to use the expression of Prof. His.

SECOND EXPOSURE—1875.

(1) *His vs. Haeckel*.—Other falsifications of plates in the same *Natural History of Creation* (Fifth Edition) were pointed out by W. His, Professor of Anatomy at the University of Leipzig, in his work on *Our Bodily Frame and the Physiological Problem of its Development* (Leipzig 1875) in the following terms:—
 "Unaltered, however, and increased by two new figures, there appear in the fifth edition of the *Natural History of Creation* those larger plates which are intended to prove the identity of form between the embryos of a dog and a man, and also between those of a fowl and a tortoise. Some of these figures are copies, others free compositions. The copies are those of the figure of a tortoise; of a *dog*, said to be four weeks old [Cf. Bischoff Plate XI 42 B. Embryo of dog of 25 days]; and of a *man*, also said to be four weeks old [Cf. Ecker, *Icones Physiol.* Plate XXX. 2, where no age is given]. Even these are copies treated freely; and the liberties

taken are all in the direction of supporting the wished-for identity. Thus, the frontal portion of the dog is lengthened by 3 mm., while the frontal portion of the man is shortened by 2 mm. and narrowed by 5 mm.—the eye being shifted to suit. On the other hand, the coccyx of the human embryo is made double the original length" [thus bringing it into close resemblance to the tail of the dog]. So that in this case, to say nothing of figures freely invented, even the copies are falsified, so as to give a false support to that identity which is necessary for Haeckel's theory of the affinity of man with the vertebrate animals.

The falsifications of the plates in Haeckel's *Evolution of Man* are also pointed out by the same author (W. His) in the same pamphlet. He writes: "Numerous embryological illustrations are given in the *Anthropogeny*. Part of them are reprints of the woodcuts from Koeliker's *History of Evolution*; the others are furnished by Haeckel himself. They are partly inaccurate in the highest degree, and partly pure inventions:—

(a) Figure 42, the primitive germ of man (magnified 40 times) in a form resembling the sole of a shoe, is an invention. No observer has yet seen this stage; and judging from the material so far collected, I am confident that, if observed, it could not have this shape or dimensions.

(b) Two figures of human embryos on page 272 are also inventions; for they represent an *allantois*, which is not only distinctly figured, but also expressly described, as a conspicuous vesicle—whereas it is well known that in man it is never visible in the form of a vesicle.

(c) The majority of illustrations on plates IV and V, showing embryos, are inventions. To take one gross instance, the embryos of the fish and frog exhibit a vertical curve in the brain as emphatically marked as it appears in those of the tortoise, fowl and mammals,

[in which animals it *does* exist, while in the fish and frog it is wanting].

"It cannot be argued (concludes the writer) that we ought to be indulgent because these are intended rather to be schematic [or hypothetical] figures. No less than twenty-four of them (three each of eight different animals) are placed side by side with the intention, clearly expressed in the text, to prove their similarity as a fact. Nor can Professor Haeckel be excused on the plea of want of skill in drawing, or want of knowledge of the methods for securing exact contours. In short, Professor Haeckel's method of dealing with illustrations is a frivolous playing with facts—"

[Hardly frivolous, we should say, when he makes his plates the demonstration-basis of his scientific contentions. A more just description would be "a criminal playing with his readers and with the truth."—ED. Ex.]

(2) C. Semper, Professor of Zoology and Comparative Anatomy at the University of Würzburg, shows in his *Open Letter* (Hamburg 1877) that Haeckel in his *Anthropogeny* (*Evolution of Man*) third edition, inserts a number of pictures of things which no man has ever seen—namely, Plate IV. Fig. 7 ; p. 207, Figs. 52 to 56 ; p. 224, Figs. 62—67 ; Plate II. Figs. 12—17 ; Plate V. Figs. 10—12.

Semper states that in the last-named figures all possible things have been fantastically added or subtracted. Of Figs. 62—69 (p. 224—227), he declares to Haeckel: "These schematic illustrations do not therefore represent schematised observations, but only your own speculations made without any observation ; and which are, moreover, in part at least directly refuted by established facts."

With reference to Haeckel's often repeated excuse that his own figures were only meant to be schematic

illustrations, Semper insists on the fundamental principle of true science that "one must at least have seen what one figures." And when Haeckel quotes in his defence the example of the great naturalist K. A. von Baer, Semper rejoins (*Open Letter*, p. 19):—"You know the saying: *Si duo faciunt idem non est idem* (If two do the same thing, it is not the same thing). Therefore tell me honestly between ourselves: do you really believe that your so-called schematic figures of primitive animals are on a par with those of Baer? Baer schematised only things which he himself had observed; while your schematisations are not based on actual observation of any real objects, but only on the idea of them existing in your imagination."

THIRD EXPOSURE—1908.

Keibel vs. Haeckel.—In 1907 Haeckel published a lecture on *The Problem of Man and Linné's Primates* (Frankfort, 1907) in which representations of embryos of man and various types of animals were given for the purpose of proving their resemblance or approximate identity. The Zoologist, Dr. Brass, formerly first assistant of the famous Professor Leuckart of the University of Leipzig, in his brochure entitled: *The Ape Problem* (Leipzig, 1908) was the first to point out and substantiate quite a large collection of forgeries perpetrated in this lecture. The result was a heated discussion which has obtained the name of the Brass-Haeckel Controversy—the particulars of which will be given separately later on. Here we decide to leave this controversy alone, and take up by preference the more concise treatment of the case by F. Keibel, Professor of Anatomy at the University of Freiburg in Baden, who is acknowledged as a far greater authority than Brass, and who a year later corroborated almost every detail of Brass's indictment.

Writing in the *German Weekly Medical Journal* 1909 No. 8 he says :—

“Let us look at the illustrations in Haeckel’s pamphlet on ‘*The Problem of Man*,’ Plates 2 and 3. The sandal-shaped embryonic discs of the pig, Plate 2 Fig. 2, seem to be taken from my *Standard Table of the Development of the Pig* (Jena 1897) but they are strongly schematised ; especially the third stage shows far-reaching alterations. In the second series (on the rabbit) the first stage is incorrect, being an altered copy of the antiquated figure 162 in *Koelliker’s Handbook* of 1879. In the third series (on man) the first stage is a bad copy of an embryo described by Count Spec, though the resemblance can still be recognised. The second and third stages are both products of the imagination, for which embryos of *Tarsius* and *Semnopithecus* [both belonging to the monkey tribe] have been made use of to a fairly large extent. The embryos of man at this stage, such as have been observed, have a totally different appearance.

“Of the nine figures given on plate 3, figures F 1 and M 1 [representing embryos of the bat and of man] are again mere products of fancy. Figure G 1 [representing the embryo of a gibbon] is modelled after Fig. 18 of Selenka’s posthumous works published by me. Haeckel has in this case, as in all other figures, omitted the *funiculus abdominalis* together with the *yolk sack*. Here, as elsewhere, the removal (one might even say the suppression) of these organs has been done clumsily, so as to erase portions of the definite body as well. It is true that Haeckel has probably left out these parts in order to facilitate comparison with anamniotic animals. Still I do not think these tamperings with the figures fortunate, though this might be regarded as open to question. In any case such schematisings should be definitely in-

licated. Selenka's figure represents a Macaque (*Cercocebus cynomolgus*) while Haeckel labels his modification of it as a Gibbon (*Hylobates*). Figure F 2 [embryo of a bat] is modelled after one of my...illustrations. Besides the removal of the *umbilical cord*, the end of the tail is slightly changed. The embryo figured by me in Hertwig's *Handbook* Vol. I, 2, p. 132, Fig. 58 a, is of *Vespertilio murinus*, while Haeckel calls it an embryo of a different kind of bat, namely the *Rhinolophus*. Again, Embryo G 2 is marked by Haeckel as that of a Gibbon. In reality however the picture is that of a macaque embryo (*Cercocebus cynomolgus*) of which he has shortened the tail [Cf. Selenka, *Anthropoid Apes*. Fasc. 5 edited by Keibel. Wiesbaden 1903, p. 357, Fig. 28]. Embryo M 2 is apparently a copy of the human embryo given by His in the Atlas to his *Anatomy of the Human Embryo* [plate 10, Fig. 12, and plate 13, Fig. 5]. Haeckel has considerably changed His's illustration.

"Finally—to omit further detailed instances—in his festival publication *Unsere Ahnenreihe* [Series of our Ancestors] Jena 1908, which pretends to be a scientific work, Haeckel prints quite a number of illustrations which are absolutely open to objection, including several of those which figured in his *Problem of Man*."

The glaring falsifications thus pointed out by F. Keibel can be conveniently summarised as follows:—(1) Keibel's embryo of a *common* bat is changed by Haeckel to suit his argument, and labelled embryo of a *horse-shoe* bat. (2) Selenka's embryo of a *Macaque* is changed by Haeckel to suit his argument, and labelled *Gibbon embryo*. (3) His's human embryo is changed by Haeckel to suit his argument, viz., instead of 33 primitive vertebrae he gives it 35, adding a tail which makes 44 vertebrae altogether; straightens the characteristic curve of the spinal column, cuts off a large portion of the brain space,

and then puts it in parallel with the animal embryos, to which the original bore only a slight resemblance.*

CONCLUDING REMARKS.

In all the instances given above, Haeckel never in a single case quotes the authority from whom he takes the picture, nor does he breathe a word about the alterations he has thought fit to make; he simply gives the pictures as if they were drawings from specimens actually observed by himself. Only experts, well acquainted with the whole range of embryological literature, were able, after much careful investigation and collation of the respective works, to trace Haeckel's "doctorings" to their source.

As these accusations have all been put forward by experts of high repute, well qualified to pass a technical judgment on the merits of the case, and proved to ocular demonstration by reproducing Haeckel's plates side by side with the originals from which they are deviations; and as the evidence has been before the public for years and has never been refuted, we consider it proved on intrinsic grounds that Haeckel has been, one might say *almost habitually*, guilty of falsifications both in plates and text, which can fairly be described as "shameless frauds and forgeries."

* These descriptions become far more effective when accompanied by the plates in which Haeckel's false figures are put in parallel with the true originals. In reprinting these articles we have managed to reproduce a few typical examples, which will be found on plate I.

PART II.

THE BRASS-HAECKEL CONTROVERSY.

IN our account of the third exposure of 1908, we have relied on F. Keibel's summary ; first, as being the work of a high class authority, and secondly, as being free from the heat of controversy. Far better known, however, to the general public in this connection is the name of Dr. Brass, the Zoologist, who was the first to make the exposures afterwards confirmed by Keibel. As this controversy effectively brought Haeckel's character and methods before the notice of the public at large ; and as efforts were made, and are still made, both by Haeckel and by his followers, to represent the affair as a victory instead of a defeat, we shall devote this article to its treatment apart.

HOW THE DISPUTE AROSE.

The origin of the discussion occurred in this way. On April 10th, 1908, Dr. A. Brass, delivered a lecture in Berlin on *Primitive Man*. He strongly criticised the theory which maintains that man is descended from the apes, and incidentally made the following remark : " Likewise some of the resemblances of embryos, as maintained by Haeckel, are based on erroneous views ; and Haeckel himself has had the misfortune to put a human head on an ape embryo, and *vice versa*." Several newspapers gave an account of this lecture, including the sentence just quoted. Whereupon Haeckel, in a letter to his friend and ardent admirer Dr. Breitenbach, described Brass's statement as "an impudent lie" and "a bold invention," and even threatened Brass with legal proceedings for "wilful calumny."* Breitenbach

* This threat of legal proceedings occurs frequently in Haeckel's controversies. It rather impresses the man in the street ; but there are no signs that Haeckel ever acted on it. In one place in his writings he confesses that there might then be danger of being convicted himself—on account of what he calls "surface reasons."

at once gave publicity to Haeckel's letter in his paper, the *Neue Weltanschauung* (No. 3, 1908). To this letter Brass replied in the *Staatsbürger Zeitung* (April 25, 1908), and in the *Volk* (same date). Here he became more definite in his charge, and pointed out specifically two cases of misrepresentation perpetrated by Haeckel: the embryos of a Gibbon and of man in Haeckel's *Problem of Man and Linné's Primates*. Haeckel took up the matter again in the *Neue Weltanschauung* (No. 4, 1908) and somewhat later in the *Münchener Neueste Nachrichten*, and boldly asserted that these two figures were exact copies from well-known authors [a statement which has been refuted by Keibel in our previous article]. He went on to accuse Brass of "wilful and bold untruthfulness" and "accusations raised in bad faith;" remarking that "unlike myself, Brass is not anxious about truth and enlightenment"—together with other strong and abusive expressions.

This article by Haeckel brought matters to a head. Brass proceeded to justify himself by putting his accusations before the general public, so that all might judge of their correctness. This he did by publishing his pamphlet: *The Ape Problem* (Leipzig 1908). It contains, in forty-two closely printed pages, an exhaustive exposure of all the frauds and forgeries to be found in Haeckel's *Problem of Man*, accompanied by four clearly printed plates, in which Haeckel's doctored figures are placed side-by-side with the originals from which they had been taken. [The main charges made by Brass coincide with those of Keibel as given in our previous article.]

Since some of Haeckel's followers have attempted to discredit Brass's attack as something aggressive and "uncalled for," it is important to realise that while his original accusation was very mildly expressed ("erroneous views" and "misfortune") he was gradual-

ly forced to take up the matter vigorously in his own defence, on account of Haeckel's strong attacks on his veracity.

HAECKEL'S DEFENCE.

Brass's pamphlet, especially on account of its plates, was so clear and convincing that no one to this day has been able to deny its correctness. The only policy which could be adopted by Haeckel was a combination of personal abuse with flimsy excuses. Thus, even before Brass's conclusive pamphlet had appeared, Haeckel in the *Neue Weltanschauung* (No. 4) had already explained the incriminated Gibbon and human embryos in the following way:—"I myself did not draw the figures in question, but had them faithfully copied by a draughtsman from the works quoted." One can easily believe that the figures were copied by somebody else; but it is quite certain that they were not faithful copies. And surely a mere draughtsman would not make such serious changes unless instructed to do so by Haeckel himself; or, even if he did, Haeckel could not have been so simple as to have overlooked the changes, especially as the originals were quite familiar figures. Such an excuse evidently could not hold water.

Haeckel himself must have recognised this. For although the "draughtsman excuse" is still sometimes met with in repetitions of the controversy, Haeckel himself later on, when replying to Brass's pamphlet, seems to have abandoned it as too utterly unconvincing. So nothing remained but to make an open confession, which he published in the *Berliner Volkszeitung* of December 29th, 1908.

The text of this confession ran as follows:—

"To cut short this unsavoury dispute, I begin at once with the contrite confession that a small fraction of my numerous drawings of embryos (perhaps 6 or 8

per cent.) are really, in Dr. Brass's sense, falsified—all those, namely, for which the present material of observation is so incomplete or insufficient as to compel us, when we come to prepare a continuous chain of the evolutive stages, to fill up the gaps by hypotheses, and to reconstruct the missing-links by comparative synthesis After this compromising confession of “forgery” I should be obliged to consider myself “condemned and annihilated,” if I had not the consolation of seeing side-by-side with me in the prisoner's dock hundreds of fellow-culprits, among them many of the most trusted observers and most esteemed biologists. For the great majority of all the figures—morphological, anatomical, histological, and embryological—that are widely circulated and valued in the best text- and handbooks, in biological treatises and journals, would incur in the same degree the charge of “forgery.” All of them are inexact, and more or less “doctored,” schematised, or “constructed.” Many unessential accessories are left out, in order to render conspicuous what is essential in form and organisation.”

This apologia was supported later on by two of Haeckel's admirers in the *Allgemeine Zeitung* of Munich. Both of them, Dr. Forel of Lausanne and Dr. Roux of Halle, insisted that Haeckel's procedure did not detract from his great merits to science, or weaken the theory of evolution. Dr. Forel explained that Haeckel let his imagination run away with him ; but on the other hand he denounced the professor's adversaries as pharisaical accusers ; while Dr. Roux remarks that Haeckel merely overstepped the bounds which separate his facts from his deductions.” [See EXAMINER, April 10th, 1909.]

THE DEFENCE EXAMINED.

Such being the defence put forward by Haeckel, let us consider its import. First, it involves the confes-

sion that a certain number of Haeckel's pictures do not represent real objects, but are hypothetical constructions, or else representations of real objects adapted, doctored or falsified. If we look at the figures thus treated—and we have seen most of them—we find they are just those which are used to prove an identity of form between the ape or other animals and man, and therefore to give evidential ground for the conclusion that they have a common descent. If these had been clearly marked as schematisations or theoretical constructions, and if they had been used as such in the text, all would be well. But the very essence of the charge against Haeckel is that he put them forward without any such labelling, and made use of them in his argument as if they were realities of nature. A scientist may make as many conjectural sketches as he likes in illustration of his theory; but he must let the reader know that they are merely conjectural sketches which *follow* from his theory, and not representations of real objects which *prove* his theory. Even where the pictures are in the first instance treated as schematic, Haeckel has a trick of using them afterwards as if they were real objects; or (according to Roux) he first creates an imaginary object by *deduction*, and then uses it as a real object for *induction*. We have actually observed Haeckel perpetrating this trick in his *Riddle of the Universe*, and can witness therefore to the truth of the German professor's charge.

Now everybody ought to see that this is, in the first place, an extremely unscientific thing to do; and secondly, an extremely misleading and dishonest thing to do. It supplies the theory of evolution with an appearance of demonstration which is fictitious. Whatever accumulation of arguments a scientist brings forward in support of his theory *as a theory*, he has no right to add arguments which, if true, would seem

to prove it *as a fact*, but which are not true because they rest on a faking of illustrations.

The fact that Haeckel on his own confession has perpetrated these enormities ; that he has put forward fictitious figures as if they were real ones, and faked copies as if they were genuine ones, and built his argument upon them—thus (in the words of his defenders) “overstepping the line between his facts and his deductions” and “letting his imagination run away with him”—is quite sufficient to show that Haeckel’s actions justify the stigma of “fraud and forgery” and that he is a man to be distrusted.

Haeckel’s confession, however, contains also an excuse. To clear himself of the charge of deceiving his readers, he declares that he has after all only done what all other embryologists and biologists have done. Such sort of excuse only makes matters worse. If true, we have here the greatest blow ever struck against the reliability of scientific men, and against the current method of pushing the evolution theory. It almost looks like a conspiracy against the truth. But fortunately we are not required to accept this damaging accusation. Prof. Haeckel himself has been proved to act in this way, and has been forced to confess it. A man capable of practising such deceit has already created a presumption against his own truthfulness ; and to try and bring the rest of scientific men under the same condemnation is an easy way of throwing dust into the eyes of the public, and escaping under the cloud thus raised. Until other scientists are really proved to be guilty of like dishonest tactics, we are bound to assume that they, at least, are honest men.

Some of the German scholars have, moreover, protested against this charge by making a distinction. They admit that schematisation has its proper place in deduction, as in the working out of a general theory ;

but it must never be used to give countenance to an *inductive* argument. Nor must any schematised figure be printed without clearly indicating its character. Thus F. Keibel (already quoted) points out that Haeckel's method is *not* the method followed in good handbooks and textbooks; and Hensen offers a like repudiation. Similarly Prof. Reinke of the University of Kiel (*In the Interests of Science*, Godesberg, 1909, p. 34) says:—"It is an unheard-of thing for Haeckel to say that all scientists treat illustrations borrowed from other authors in the way he has treated them. The very contrary is the case. I know of no single author who does not indicate in the margin the exact source from which a picture has been taken. In all such cases either the original is copied exactly; or, if minor details are left cut (which, however, must never be prejudicial to the meaning of the whole figure) they always state that the copy is schematised."

If scientists in general have not hastened to defend the collective body from this accusation, it is only because they know that it is too obviously untrustworthy to need refutation. So while our particular confidence in Haeckel is gone, our general confidence in the honesty of eminent scientists remains.

THE KEPLER-BUND.

Still the fact remained that Haeckel had cast a slur on the general body of scientists in Germany. In order to show the gratuitousness of this charge, the Kepler-Bund—perhaps the largest Natural History Association in Germany—took up the matter. A circular was prepared and sent round to the zoologists, anatomists and embryologists of the German universities, with a request to answer the following questions:—(1) Do you approve of Haeckel's methods, as exposed by Dr. Brass, of filling in missing-links in evolutionary

series? (2) If Haeckel changes original drawings of Selenka and His and then gives them different names, do you think them to be lawful schematisations? (3) Do you acknowledge as true what Prof. Haeckel maintains, namely, that other scientists follow a course similar to his own in this matter? (4) Are you of opinion that a protest should be raised against such an accusation, in order to restore public confidence in science?

This circular had a somewhat different effect from what was expected. It is true that a small number—fifteen in all—answered the questions proposed to them; and also that not one single professor said a word in defence of Haeckel, or took up his cause. But outside these, a considerable number of scientists were annoyed with the steps taken by the Kepler-Bund. They feared that some kind of vexatious supervision over their publications might be inaugurated, and resented this possibility as an unwarranted interference. In order to express these feelings, a number of them, instigated by Prof. Rabl of the University of Leipzig (an old pupil of Haeckel's), drew up and signed collectively a document which is now famous as "the declaration of the forty-six."

VERDICT OF THE FORTY-SIX.

This joint declaration was published in the *Münchener Allgemeine Zeitung*, No. 8, 1909, and ran as follows:—

"The undersigned professors, directors of laboratories, etc., herewith declare that they do not approve of the method of schematising which Haeckel has in some instances made use of. At the same time, in the interests of science and professional freedom, they condemn in the sharpest manner the warfare waged against Haeckel by Brass and the Kepler-Bund. They

declare moreover that the evolutionist idea can suffer no detriment from a few inaccurately produced embryo-diagrams."

VERDICT OF THE THIRTY-SEVEN.

The Kepler-Bund did not take this rebuke lying down. They organised another circular, for which they secured the signatures of twenty-six specialists in various branches of biology, and of eleven other prominent men—representing altogether nineteen universities, botanical laboratories, etc., in Germany, Switzerland and Austria, including Haeckel's own university, Jena—thirty-seven names in all. This document was published in several papers simultaneously (*Augsburger Postzeitung*, *Norddeutsche Allgemeine Zeitung*, etc.). The part of it which directly concerns the Brass-Haeckel controversy runs as follows:—

"In response to a statement published in the newspapers under the signature of a number of zoologists and anatomists, we, the undersigned professors, directors of scientific institutes, etc., members as well as non-members of the Kepler-Bund, beg to state the following:—

... We are in complete agreement with the Kepler-Bund when they declare it to be a matter of honour to insist that uncompromising love of truth, together with strictest personal sincerity, should be looked upon as indispensable features of German scientific research. Whosoever offends against these foundations of scientific investigation and teaching, deserves severe repudiation. Though opinions may differ ever so widely as to what the truth is in individual cases, yet about truthfulness itself we must all agree, otherwise science loses the ground from under its feet. What should we say if a historian, in order to push through a favourite opinion of his own, were to alter the letters of an

inscription? Haeckel's want of conscientiousness when popularising scientific facts and philosophical ideas has been shown up not only by Dr. Brass but by others as well. We refer first and foremost to William His, who as early as 1875, in his classical book *Our Bodily Frame*, ruthlessly condemned the wilful alterations perpetrated by Haeckel with regard to the material of scientific research made use of in his arguments. We cannot assent to a laxity of opinion which regards as unimportant such alterations of the illustrations of other scientists as have been discovered in Haeckel's writings by Rüttimeyer, His, and Brass

Besides this collective rejoinder V. Hensen, Professor of Physiology at the University of Kiel, writing on *Truthfulness in Morphology* (*Unsere Welt*, April 4, 1909) says: "In a declaration published in the *Vossische Zeitung*, forty-six scientists, in a certain discussion on Haeckel's confession, have called the latter's falsifications "*schematising*," and thus pardoned them. An Areopagus of forty-six representatives of morphological science, who occupy the front rank, surely ought not first to cast a veil over the facts of the case, and then pardon Haeckel's deliberate untruthfulness as mere inexact reproduction." Then, apostrophising personally one university professor, he goes on:—"I maintain that you will not in all your publications find anything which even remotely approaches to such frauds and mischievous products of fancy as those which Haeckel has offered in great numbers to his defenceless lay audiences."

THIRTY-SEVEN PLUS FORTY-SIX.

Although the *intrinsic* evidence of Haeckel's misconduct is absolutely demonstrative, the *extrinsic* testimony—namely, the condemnations by other scientists—

appears at first sight less impressive in consequence of the compromising answer of "the forty-six," who, though they said that "they did not approve" of Haeckel's methods, yet at the same time "condemned sharply" the violent crusade made against him. Still two things are clear from the document. First, they did after all express their disapproval of Haeckel's method; and if it had been nothing but what was customary among biologists, they could hardly have found any ground for disapproval. Secondly, the expression of this disapproval was given with reluctance; and *therefore* it has a far stronger testimonial force than the mildness of its terms would suggest. We think the answer of "the forty-six" is easily explainable. The campaign of Brass was conducted in a somewhat noisy and turbulent manner, and they did not like the idea of being implicated in the affray. Professional men, whatever their own opinions, do not like being dragged into public and forced to commit themselves to the signature of a collective document—which would look like combining against a brother-professor and proceeding to kick him when he was down.

But the mainspring which set the circular of "the forty-six" in motion—so at least we are assured on the personal knowledge of our informant—was that well-known battle cry "Freedom of science," which, in Germany especially, is always being proclaimed in and out of season: "Science must be absolutely free and unfettered. A scientific worker—especially a professor in a University—may in the course of his investigations arrive at any conclusion, may give expression to any theory or idea; and no tribunal in the world has any right to censure him." Such a tribunal "the forty-six" suspected—though wrongly—was in process of formation among the Kepler-Bund. It was chiefly for this reason that they repudiated its interference as

something contrary to "the interests of science and freedom of teaching."

It remains, however, that the verdict of "the forty-six," though a mild one, was still a condemnation and not an approval. It was a verdict *not for* but *against* Haeckel. Hence in conclusion it is correct to say that the methods of Haeckel, in the instances which had been exposed, were condemned by 46 plus 37—that is, by eighty-three men of good position in various branches of science and learning, besides others who published their condemnations apart.

Thus the outcome of the Brass-Haeckel controversy is an additional corroboration of the intrinsic evidence that Haeckel has been convicted of "shameless frauds and forgeries."

PART III.

FURTHER TESTIMONIES.

OUR first article contained a statement of the three exposures of 1868, 1875 and 1908, giving details of the pictorial falsifications of Haeckel. Our second article dealt in particular with the Brass-Haeckel aspect of the last-named exposure. In this third number we corroborate the foregoing evidence by collecting together some other pronouncements by various authors, showing the estimate at which Haeckel is held in scientific circles. Nearly all the authors quoted are men of altogether independent thinking, free from attachment to any theological school—which might be supposed to prejudice their minds against Haeckel. The two

who are theologians in any sense of the term are clearly indicated :—

(1) L. Rütimeyer, Professor of Zoology and Comparative Anatomy at Basle University, in the article quoted in our first paper, says that some of the illustrations in *The Natural History of Creation* have been invented by the author, while others have been “wilfully modelled or generalised.” He calls this way of acting “a sin against scientific truthfulness deeply compromising to the public credit of a scholar.”

(2) W. His, Professor of Anatomy at Leipzig University, in his work on *The Form of our Body and the Physiological Problem of its Development* (Leipzig 1875) after passing some strictures on Haeckel’s figures, says :—“Prof. Haeckel’s methods are a frivolous juggling with facts, more dangerous than the foregoing juggling with words. I myself have been reared to believe that among all qualifications of scientists, reliability and unconditional regard for actual truth are the only ones that cannot be dispensed with. I am of opinion that if this qualification is wanting, all others, be they ever so brilliant, lose their splendour. Though some, therefore, venerate Haeckel as an active and undaunted party-leader, yet by the way he conducts the battle he has in my opinion renounced the right to stand on a par with serious scholars.”

(3) C. Semper, Professor of Zoology and Comparative Anatomy at Würzburg University, in *Haeckelism in Zoology* (Hamburg 1876) says :—“It is not enough that Haeckel lays down hypotheses as if they were established propositions. Even the facts of observation (*Beobachtungstatsachen*), which form or are supposed to form the basis of his system, can no longer be accepted by zoologists as realities. By way of example :—In his *Evolution of Man* he figures a very early stage of the individual development of man as if he had seen it

himself. As a matter of fact no scientist so far has ever seen it." Semper also says to Haeckel:—"I truly admire the way in which you reject all dogma with horror, while at the same time you thrust on your readers dogmas which are not only unproved, but are often unprovable and false. In short, I admire your proficiency in the art of leading the public by the rotten strings of your so-called scientific investigation."

(4) Adolf Bastian, Professor of Ethnology at the University of Berlin, one of the most illustrious scholars of his profession, in the postscript to his *Open Letter* (Berlin 1874), addresses Haeckel in the following blunt terms:—"Thus I am afraid I must adopt the opinion, hitherto so repugnant to me, that there is nothing in you but wind and gasbagging; and, as some signs apparently indicate, a dangerous ignorance, even of things which may still be taken as belonging to your branch of learning. The testing of your knowledge on these points must be left to zoologists and physiologists. As to myself, I feel now almost sorry for having condescended to answer you."

(5) V. Hensen, Professor of Physiology at the University of Kiel, in his *Plankton Expedition and Haeckel's Darwinism* (Kiel 1891), referring to some of Haeckel's statements regarding that expedition, says:—"This is explicit enough. But then one can never trust Haeckel." A little further on we read:—"This is Haeckel's way of fighting an enemy. He picks out part of a statement, and by the aid of his imagination gives a nonsensical account of it; then he attributes the whole to his opponent, and refutes it with triumph."

(6) K. Brandt, Professor of Zoology at the University of Kiel, the companion of Hensen on the Plankton-Expedition, replied to Haeckel's attack in a similar strain (See *Haeckel's Views on the Plankton-Expedition*, Kiel 1891):—"It is characteristic of Haeckel's po-

lemics that he tries, in the first place, to make his antagonist look ridiculous or to represent him as utterly stupid. And in order to do this any expedient is considered fair. A cursory perusal [of his opponent's work], and a perversion of this or that sentence, are sometimes sufficient to achieve this result; otherwise, something else must be attributed to the author, which he has not said."

(7) W. Roux, Professor of Anatomy and Director of the Anatomical Institute of Halle University (quoted in a pamphlet entitled *In the Interests of Science*, Godesberg, 1909, p. 42), mentions a method repeatedly used of Haeckel which is described as follows: "He starts from a principle which is supported by many facts, or which he believes to be so supported, and proceeds to fill in the gaps by *deductive* reasoning. Then he turns round and makes use of these imaginary objects by which the gaps are filled, as if they really existed, and as if they furnished additional *inductive* evidence." [Thus, assuming that man was descended from the apes, he filled in the missing-links from his imagination; and then made use of these imaginary missing-links as if they afforded so many proofs of the unbroken descent.] This method, says Roux, "is not to be approved of."

(8) F. Keibel, Professor of Anatomy at Freiburg University, in his article in the *Medical Weekly Journal* already quoted, says:—"From what I have said so far, it clearly appears that Haeckel has in many cases either freely invented embryos, or reproduced the illustrations given by others in a substantially changed form; and this not only when it was a matter of filling up gaps by means of hypotheses, but even without stating that it was a matter of diagrams and hypothetical forms. It must be pointed out that this is not the method followed in good handbooks and textbooks; and that such a practice can only be termed altogether unscientific."

Brass has therefore, in the substance of his contentions, justly raised objections to Haeckel's illustrations of embryos."

The same author, when exposing Haeckel's falsifications in the *Problem of Man* (already given) adds the following strange suggestion by way of excuse: "Imagination and the fanaticism of the founder of a religion make him see things as he represents them."

(9) H. Obermaier, Professor at the *Institut de Paléontologie Humaine*, Paris, in his work on *Primitive Man* (Berlin Vol. I., p. 375), says:—"Mention must here be made of embryology. We must leave out of count exaggerated and one-sided views, which attempt to exhibit the human embryo as a kaleidoscopic mosaic of ancestral relics. Much less need we take notice of certain falsifications by which Haeckel has duped his readers down to the present time. These [falsifications] as well as himself, must fall under the condemnation of any serious audience." [This writer is a Catholic priest, but also an anthropologist of international repute.]

(10) Dr. Koelsch of Zurich, in a long article on the Haeckel-Brass controversy in the *Münchener Neueste Nachrichten*—the chief organ of anti-religious liberalism in Southern Germany—referring to Haeckel's attempt to incriminate other scientists, writes: "When I read these lines by which Haeckel sought to justify himself, I blushed with shame for him" [See EXAMINER, May 8th, 1909]. He adds with a somewhat sardonic humour: "Haeckel reminds me of the Englishman who, on reaching a place where a mountain was marked in his *Baedeker* and finding that there was no mountain there, observed solemnly: 'There is something wrong about this country.'" [Rome, March 7th, 1909].

(11) Dr. Paulsen, a Protestant Professor of Philosophy at the University of Berlin, writes [about *The*

Riddle of the Universe]: "I have read this book with burning shame ;—shame for the condition of our people in general and philosophical culture." [*Month*, Oct. 1910]. "That such a book should be possible, that it should be produced, printed, bought, read and admired among a people that has had a Kant, a Goethe, and a Schopenhauer—this is truly lamentable." [EXAMINER, May 23rd, 1914.]

(12) Professor Otto Hamann, in *E. Haeckel und seine Kampfweise* (p. 2), writes :—"Why, it will be asked, do you at this time of day undertake to combat this 'Champion of Darwinism' ? Has not the man been long ago found guilty of untruths ever afresh charged against him, of which his own works are evidence ? True, I reply, so it is. But the great public cannot conceive and comprehend that all which is proffered by Haeckel as fact and truth, is but fancy, or at best hypothesis." (*Month*, Oct. 1910.) In the same pamphlet he says : "Formerly I worshipped the man ; and I defended his excesses against other zoologists, until the time came when he lied even to myself."

(13) Professor Chwolson of the University of St. Petersburg, one of the leading physicists of our time, in his *Hegel, Haeckel, Kossuth und das zwölfte Gebot*, thus writes :—

"We had set ourselves the task to enquire how Haeckel behaves towards the twelfth commandment : [Thou shalt never write of aught about which thou knowest nothing] ; whether, in regard of scientific questions which lie outside his special branch, he exhibits that thoroughness and deep seriousness which would make him one of the great leaders of his own time ; or whether, slighting this commandment, he writes of matters concerning which he has no glimmer of an idea. To settle this question, we carefully studied all that the *Riddle of the Universe* contains concerning physics.

Material there is in plenty, for questions of physics play a large part in the book ; and one of these is for the author the 'lode-star' guiding his philosophy through the mighty labyrinth of the world-problems. The result of our examination was startling, not to say astounding. Everything—yes, *everything*—touching physical questions which Haeckel says, expounds or affirms, is wrong ; is grounded on misunderstanding, or exhibits an almost incredible ignorance of the most elementary points. Even of the law [of Substance] which he declares to be the 'lode-star' of his philosophy, he has not the most elementary schoolboy knowledge ; and on the strength of such entire ignorance he is prepared to demonstrate that the very foundation of modern physics must be renounced as unsound."—(*Month*, Oct. 1910.)

(14) Dr. Julius Wiesner, Professor of Plant-physiology at the University of Vienna, and a botanist of international repute, speaks of Haeckel as "one who in his most recent writings exhibits himself as a fanatical misleader of the people; one who, with delusive assurance, puts forth what have long been recognised as errors and mistakes as if they were verities ; and who treats his opponents with unexampled insolence." (*Month*, Oct. 1910).

(15) Professor Branca, when reviewing Haeckel's *Riddle of the Universe*, wrote : "This, therefore, is the 'freedom of science' as the fanatics of Monism understand it. The *Riddle of the Universe* is like a rod raised in warning, and making it clear to everybody that his credibility and honesty will be questioned, if he dares to differ in opinion from Haeckel."

(16) J. Reinke, Professor of Botany at the University of Kiel, one of the first living authorities on plant-biology, receives quite a special share of abuse from Haeckel and his followers (notably the Monist Alliance)

because in a speech delivered in the Prussian House of Lords on May 10th, 1907, he warned the authorities and the general public against Haeckel's pseudo-science. After briefly showing Haeckel's deficiencies in physics, philosophy and theology, he turns to his special branch, and says: "Although Haeckel is a professor of zoology in a German university, I must not withhold my opinion that the biological portions of the *Riddle of the Universe* are just as wanting in true science as the portions which deal with physics, etc. The reason is because, wherever biology comes in, Haeckel uncritically jumbles together proved and unproved matter, and thus creates a chaos in the mind of his readers. It is the opinion of not a few that, on account of his lack of critical disposition, Haeckel forfeits all place in the ranks of serious naturalists. When this much has been said, nothing of Haeckel remains except the fanatic, who, in union with the Monist Alliance, tries by force to assert his mastery over the minds of the people."

The same author, in his *Haeckel's Monism and its Votaries* (Leipzig 1907, p. 20) writes as follows:—"Just as the *Riddle of the Universe*, so also *The Wonders of Life* is, in my opinion, a special-pleading work (*Tendenzschrift*) without scientific value, because it does not advance our scientific knowledge in the least. As regards the instruction of the people, it is not only useless but harmful; for it gives an uncritical, even a distorted idea of our biological knowledge. It contains, moreover, a great number of positively wrong statements. In short, though not intended as such, it ought to be called a huge parody of modern biology, rather than a biological handbook. Haeckel is so blinded by his prejudices, so spell-bound by his illusions, that he is incapable of distinguishing them from scientific facts—though he propounds them as facts, with all the appearance of professional wisdom, nay of infallibility. The work seems

to furnish a symptom of scientific degeneracy. It is a regular 'Commercial-traveller's-sample-case' of superficialities and shallownesses, and therefore absolutely unreliable. To show in detail how recklessly Haeckel handles truth, I must content myself with two instances, —though I could give many others." The chief instance he quotes is taken from botany, the other from anthropology; and after giving them he asks his readers: "Is this conscientious? Is this truth-loving? Is this scientific?"

To this pamphlet Haeckel made a rejoinder in his *Problem of Man* (1907), which brought Reinke again into the arena. In a pamphlet entitled "*The Latest about Haeckelism*" (Heilbronn 1908) Reinke fills seven pages with parallel columns; the one containing "what Haeckel says," the other "what the truth is." He gives twenty-four instances of misrepresentation perpetrated by Haeckel, and adds: "These are samples taken at random. It would be possible to multiply their number many times." The instances themselves we reserve for a future article, giving only Reinke's concluding remark (p. 14):—"From this parallel between Haeckel's statements and the corresponding facts, the reader may draw his own conclusion. All will undoubtedly agree with me that though Haeckel's utterances have no claim whatever to acceptance, there is at least method in them."

(17). Among English scientists Sir Oliver Lodge, after passing a stricture on Haeckel's contentions about the nature of life, writes in his *Life and Matter*:—"It is just these superficial and hypothetical, and, as they seem to me, rather rash excursions into side-issues, which have attracted the attention of the average man and have succeeded in misleading the ignorant."

(18) Balfour, the leading English embryologist, in an article on *The Development of Elasmobranch fishes*

(Journal of Anat. and Physiol. Vol. X. 1876) complains of Haeckel's besetting fault of making a wrong use of other people's illustrations. He says that Haeckel has taken one of Balfour's plates of the germ-disc of a *Mustelus*, and given the impression that Balfour's observations confirm his view ; whereas in fact the exact contrary is the case.

(19) Dr. Houston Stewart Chamberlain, Botanist and well known philosophical writer (now living in Vienna) in his work on *Emmanuel Kant ; his Personality as an Introduction to his Work* (1905 p. 512) says:—" If the layman wants to know how Haeckel in his genealogical pedigrees suppresses and alters facts, let him read Chapter III of Louis Agassiz's *De l'espèce et de la classification en Zoologie* ; also Milne Edward's little classic: *Introduction en Zoologie Générale*, Chapter VI. Here he will find a summary of all the relevant embryological facts, and will also see the mischievous distortions of truth—due to mind-crippling suggestion—on which the whole Haeckelian system is based."

CONCLUSION.

The German professor, from whom we derive these notes, informs us that "this long list of quotations, condemning Haeckel and his methods of popularising natural history and philosophy, could be continued almost indefinitely. Those witnesses only have been chosen who are well known as leaders in the field of science, most of them professors in universities; and whose right to speak with authority cannot fairly be questioned. They are all recognised authorities in their own branches of learning, and famous through the important works which nearly everyone of them has published ; and they have all declared themselves against Haeckel's popularising methods in unmistakable terms. Much more might be quoted. But only those state-

ments have been selected which bear more or less directly on our point, namely, the question of frauds and forgeries."

FOR THE DEFENCE.

A perusal of these testimonies makes it an undeniable fact that numbers of first-rate scientific authorities have declared against Haeckel's popularising methods. On the other hand it will be asked: Where are his defenders?

Among them comes forward most prominently H. Schmidt, private secretary to Haeckel himself; whose work, *Haeckels Embryonenbilder* (Frankfurt a. M. 1909) was written under his master's own supervision, and therefore may be taken as quasi-official. It contains amongst other things (p. 27—37) a selection of comments on the Brass-Haeckel controversy drawn from various current newspapers. We may be sure that Schmidt and other supporters of Haeckel would have been keen in collecting anything which appeared in their favour. All the passages quoted contain some attempt to exonerate Haeckel; and yet not one of them goes so far as to give him what is called a "clean bill." Every writer seems bound to acknowledge that there was something wrong in Haeckel's procedure. We quote only a few short extracts:—

(1) Dr. A. Reitz (p. 29) says:—"Haeckel in trying to jump over the barrier of his falsifications has clumsily tripped himself up. He says that 'other professors do just the same with their illustrations.' Professor Haeckel! we sincerely hope not. Haeckel wishes to make us believe that this kind of falsification is a correct scientific practice. Thank God, it is not so, and never will be so, as long as the service of truth prevails in the sense in which it prevailed among our old venerable savants. . . . What should we come to

if each investigator were to create proofs—and pictures *are* proofs—for his hypotheses by constructing the necessary missing forms out of actually observed forms, without marking them as constructed?" The article goes on to accuse Haeckel of "blinkering" the public, of wilfully omitting to call his figures schematic, etc.

(2) Prof. Dr. O. Zacharias (p. 30) writes:—"Excellent scientists have long ago pointed out what was objectionable in Haeckel's figures of embryos, which are frequently doctored, and therefore divergent from nature. In spite of this, Haeckel has never shewn himself inclined to make any change in his popularising methods." Further on he speaks of "the fairy tales of the so-called genealogical trees," and records the opinion of "those who regard Haeckel's *Riddle of the Universe* as a genuine calamity in the department of popular scientific literature."

(3) Dr. A. Koelsch (p. 33-34) comments thus on Haeckel's confession:—"It has turned out a poor thing, this defence—very poor. I make this statement with the deepest regret. Haeckel tries to extenuate his fault by denouncing, without any plausible reason, the whole biological body, as being universally guilty of the same laxity. For he maintains that the illustrations of the best text-books are worked up in the same way as his own incriminated figures are worked up. When I read these lines I blushed with shame for Haeckel. Surely he ought to know, first, that no one clears himself from blame by saying that others have done the same. Secondly, he ought at least to have known that a scientist, modifying other authors' original figures, is in duty bound to quote the source from which he has borrowed, and to mark schematised figures unequivocally as such. Thirdly, Haeckel ought to have known that this is the actual practice of all self-respecting scientists. Hence it is altogether intolerable to throw

on them the same suspicion which Haeckel has brought upon himself. What other scientists have done is precisely what Haeckel did *not* do; and herein lies the blame which will always remain attached to him."

(4) Dr. E. Teichmann (p. 39) gives his judgment as follows:—"Can Haeckel's reply to his accusation suffice? I fear that nobody, after an unbiassed examination of the circumstances, will have the courage to say 'Yes.' The author of popularising scientific works has undoubtedly the right to adapt his text, as well as his illustrations, to the intelligence of his lay readers. He may leave out unessential parts and emphasise essential parts; he may likewise schematise and construct. But—and this is a law never to be evaded—he must not keep the reader in the dark as to what has been done. Had Haeckel, in the explanations of his plates, pointed out the originals they were taken from, and stated that he had schematised them and considerably altered them, he would have escaped the charge now laid against him. Even so, I am bound to confess that, in my opinion, changes of such importance as he has made in his figures of embryos would far exceed the justifiable limit of modification, even if the fact of modification had been openly declared."

Of the four authors quoted, one, namely Dr. Zacharias, says openly that he is not an admirer of Haeckel, and that he cannot exonerate him from the charge of forgery. The other three are certainly among Haeckel's friends, and might be expected to do the best they could for him. We have selected them out of several writers who, while otherwise trying to exonerate Haeckel, cannot do so without an accompanying censure; and it is important to note that not one single unqualified defender of Haeckel appeared on the scene.

It is obvious that a number of quotations from what one might call "ordinary journalism" could be got

together speaking of Haeckel's popular works in terms of praise. No one denies that Haeckel has a following of enthusiastic disciples even in scientific circles—though few of them occupy any high rank or reputation. Among these H. Schmidt, in the work already quoted, has gathered together seventy-two reviews favourable to *The Riddle of the Universe*. Most of these are of an entirely unspecialist character. Only two were taken from biological journals—both signed by men of small note. None of the leading biological journals, and to the best of our knowledge none of the leading scientists—not even those who share monistic views—have said a word in favour of Haeckel's popularising methods.

SCIENTIST VS. POPULARISER.

It is true that a number of leading scientists have bestowed high praise on Haeckel; and such men as Huxley, Lang, Hertwig are often quoted in this connection. But when these eulogies are examined, it will always be found that they apply to Haeckel the zoologist. It is acknowledged on all hands that Haeckel has done eminent work in those branches of zoology which he cultivated as a specialist, e. g. the *Radiolaria*, *Siphonophora*, *Medusae*, *Calcispongiae*, and some of the closely allied fields of natural history. It may, however, be mentioned that even here he has not enjoyed the full and implicit confidence of his colleagues. Thus Prof. Hensen says, with regard to a deep-sea Medusa taken during the Plankton expedition: "We had it figured by Mr. Eschke, because Haeckel's fancy pictures of these animals have given too much offence"—thus showing that even in his exact inductive studies Haeckel's artistic fancy was a danger to him.

This danger became the greater as soon as he passed from inductive work to the construction of theories, even of a strictly scientific kind. Haeckel himself

acknowledges how little impression his theoretical works on biological subjects made among his scientific colleagues ; and that it was the failure of his *General Morphology* which made him seek a more popular audience, beginning with his *Natural History of Creation* (Riddle, p. 66) and passing on to the still more popular *Riddle of the Universe*. Here we lose sight of Haeckel the zoologist, and find ourselves confronted with Haeckel the populariser—the apostle of monism ; the propounder of the “theoretical interpretation of empirical knowledge ;” the guide on “the path of empirical investigation and the monistic philosophy which is based on it.” (See Author’s preface to *The Riddle of the Universe*).

Between Haeckel the zoologist and Haeckel the populariser the difference is most remarkable. Writing for scientists Haeckel seemed to feel the restraints of a critical environment, and assumed a modesty and tentativeness of manner which is quite edifying. In writing for the general public this restraint disappeared. A vivid imagination and enthusiasm for his own opinions seemed to run away with him ; it led him to write confidently on things he knew little about, to build up far-reaching theories on scanty data ; and finally, by a sort of “Rake’s progress,” to begin doctoring his facts because they did not give support to his theories. Hence it is that the honours which Haeckel has received, and the testimonies which can be quoted in his favour, will, when looked into, be found to apply only to his strictly technical and scientific works. As soon as we pass to his popularising works, all praise and honour comes to an end, and in its place Haeckel is inundated with a deluge of condemnation.

The plain fact is, Haeckel has made his present fame—by no means an enviable one—not as a leading scientist of any kind, but as a theoriser of the most extreme and

reckless type ; a free wanderer over a wide range of subjects, scientific, philosophical, historical and theological, of which he has made no adequate study. It is among the non-specialist reading public that Haeckel has secured a reputation as a vehement anti-religious populariser ; while among the majority of strictly scientific men, whether believers in religion or not, he has, by his crooked methods of popularising, forfeited all the esteem he ever enjoyed, and has even earned the invidious distinction of bringing discredit on the name of science.

Such is the general impression which, outside a certain narrow circle of disciples, seems to prevail in the scientific world of Germany about Haeckel. This being the case, we feel justified in reiterating the verdict to which the whole evidence points ; namely, that Haeckel as a populariser is not only to be regarded as utterly untrustworthy, but that he has in the course of his popularising work been guilty of proceedings which can only be described as "shameless frauds and forgeries."

PART IV.

OUR CORRESPONDENT'S LETTER.

HAVING in the foregoing pages fulfilled the first part of our task, namely, to show "what is the accusation against Haeckel, and how far it is substantiated," we here throw in a sort of interstitial article dealing with the counter-statement of our correspondent, which has proved so useful in stimulating us to a full treatment of this interesting subject ; and which will further

enable us to clear up some minor points left alone in the previous articles. In his letter of May 24th, he opens by saying that he does not write to refute the first part of THE EXAMINER article, but is only concerned with the "offensive statement with regard to the R. P. A."—with which we shall deal separately in the sequel. As this statement was made to rest on the instance of Haeckel, he proceeds to give what elsewhere he calls the "correct version" of the Brass-Haeckel controversy.

IGNORANCE OR DECEPTION?

Our correspondent commences with the following remark:—

"Permit me to tell you that you are either ignorant of the facts of the Brass-Haeckel controversy; or if you are not, you deliberately mislead your readers in trying to make them believe all this nonsense about Prof. Haeckel."

Comment.—As we do not know the contributor of the article in THE EXAMINER of May 23rd, we cannot answer for him personally. We can only say that among the Germans of our acquaintance the Haeckel case enjoys a household familiarity which is quite natural, seeing that they belong to the country in which the controversy took place—several of them having been on the spot at the time it occurred. THE EXAMINER itself certainly cannot plead ignorance. The issues of our paper dated Feb. 20, April 10, May 8, and August 14th, 1909, taken together, contain everything which our correspondent himself has contributed *soundly* on the subject, and a good deal more besides. THE EXAMINER, therefore, cannot plead ignorance. Secondly, the statement of the whole Haeckel case given in the foregoing pages, which confirms everything previously printed in THE EXAMINER, shows that we cannot acknowledge deception either. We can claim to have known the

case in all its essential points, and to have put it forward honestly in the columns of *THE EXAMINER* at the time it occurred.

(2) On the other hand, our correspondent would be mistaken if he fancied that his meagre account of the Brass-Haeckel controversy is anything like an adequate handling of the Haeckel case at all. The imputation of frauds and forgeries against Haeckel, as we have shown, is a long-standing affair comprising three exposures—in 1868, 1875 and 1908 respectively; and the scholars on whom these exposures rest are Rüttimeyer, His, Semper and Keibel. Dr. Brass, the Kepler-Bund, and the whole of that noisy controversy might be obliterated, and yet the entire indictment against Haeckel would stand good.

(3) Finally, our correspondent shows inadequate knowledge in talking of the accusation against Haeckel as “nonsense.” No one who knew the number of serious scientists who have worked over the subject, and delivered their verdicts as a result of painstaking study, could be so bold as to waive aside the whole affair as “nonsense.”

UNSCRUPULOUS THEOLOGIANS; LEADING BIOLOGIST.

Our correspondent goes on:—

“In stating that Haeckel on his own confession had been convicted of frauds and forgeries in connection with his biological works, you are only repeating the malignant and dishonest statements which unscrupulous theologians have thought fit to circulate about Prof. Haeckel, the acknowledged leading biologist of the world. Of course it is not a matter of surprise to us rationalists that religious obscurantists of scientific truths should resort to all sorts of unscrupulous means to belittle their opponents. It has ever been their tactics, and doubtless they depend on the amazing credulity of their adherents to

tell them all sorts of absurdities and falsehoods about those who differ from them; things, as we know, that will not stand investigation for a moment."

Comment.—This paragraph is so highly characteristic of the controversial style of Haeckel and his followers that we reproduce it gladly just to show our readers what that style is. The clerical bogey is ever on their brain and on their lips; and everything, more or less, is clerical which stands against their theory. Every tinge of belief in free-will, in spirit, in a vital principle above chemical and mechanical force, is first dubbed "dualism." Then dualism is identified with "supernaturalism," and supernaturalism with theology. No one who entertains such anti-monistic "myths" and "absurdities" can be a sound, still less an independent thinker. If he is not a professing theologian he is an occult one; and the clerical incubus lies upon him. If he is not a wilful obscurantist himself, he is at least the victim of other obscurantists. If any believer in God and religion figures high in science, this is in spite of his belief, and not in accordance with it. For between religious belief and true science there is a great gulf fixed—a total polarity; the one cannot consistently subsist side-by-side with the other. This is what we mean by the clerical bogey.

(2) But enough of this. As we shall later on make a study of Haeckel's own controversial methods, as distinguished from his scientific methods, we shall here content ourselves with the remark that the whole of our indictment of Haeckel is the work of professors of biology or zoology, men of independent position and ways of thinking, who would be greatly amused to find themselves classed with "unscrupulous theologians" or "religious obscurantists." They would be equally amused at finding themselves all relegated to a back-

seat in the world of science, and Prof. Haeckel put over their heads as "the acknowledged leading biologist of the world."

(3) The German Doctor of Biology who is our authority in this matter, and who was at the Berlin University while the Brass-Haeckel controversy was raging, and was in touch with the scientific feeling on the subject, assures us that "the leading biologist of the world" is a designation grotesquely false. Haeckel is acknowledged to have done very good practical work in a certain narrow field of systematic zoology [See Part III]; but this is the limit of his original research. Nearly all his other writings—notably the *Riddle*, the *Wonders of Life*, etc., are compilations, in which he puts together the facts observed and recorded by others, mixed up with fictions of his own, and then draws from them the philosophical conclusions of Monism. Haeckel is no doubt a most prolific writer on the theory of evolution; but in spite of his many treatises, he has never imposed himself on the scientific world as a "leading" authority, even on this his pet subject.

Take for instance Oscar Hertwig, Director of the Anatomico-biological Institute of the University of Berlin; an old pupil of Haeckel's, whom Haeckel himself holds in high esteem (See *Riddle* p. 23). Now when Hertwig, in his book on *The Fight about the Fundamental Questions of the Evolutionary and Hereditary Doctrine* (1909) drew up a list of authors to be consulted, he named twenty-five eminent biologists who have notably promoted scientific knowledge on this subject; and yet among the twenty-five he did not include Haeckel! If Haeckel stands only as one among the rank and file of ordinary biologists, the omission is intelligible. But how could his name be simply passed over—omitted even from "the first twenty-five"—if he were in reality "the leading biologist of the world?"

Or take again Kohlbrugge, author of *The Morphological Descent of Man* (Stuttgart 1908) the finest summary of that subject on which Haeckel writes comprehensively in his *Anthropogeny*. At the end of his book Kohlbrugge, in 123 "annotations," mentions every publication of importance on the subject—and yet he omits Haeckel's *Anthropogeny* altogether. Haeckel's name appears indeed in the text, but only as one of "the fanatics of the Darwinian camp"—"as opposed to the "more critical investigators" (p. 6). Lastly, Stratz, in his great work the *Natural History of Man* (Stuttgart, 1904) speaks only of Haeckel's "too forward conclusions" (p. 19); rejects repeatedly his genealogical pedigrees (pp. 14, 47); and nowhere treats the author of *Anthropogeny* even as a writer of importance. Anyone who calls Haeckel "the leading biologist of the world" opens himself to the inference that he knows no other biologist greater than Haeckel. But if so, one can only say: Heaven help him! It would be interesting to know what authors of the least weight have ever described Haeckel as "the acknowledged leading biologist of the world." "The leading monistic prophet of the world" would perhaps be more to the point.

THE CLERICAL VERSION.

Our correspondent proceeds:—

"Since you have been so good as to tell the well-known clerical version about the Brass-Haeckel affair, and as you are so eager for truth, I venture to think that you will publish this in order that your readers may know the exact facts about this absurd accusation on Haeckel."

Comment.—Since the account in THE EXAMINER of May 23rd is the "clerical" version—certainly it was written by a cleric, at any rate—we have tried to satisfy our correspondent by producing another version, which unhappily is also written by a cleric, but which

is in itself about as "unclerical" a production as one could possibly make it. In this account we have hardly drawn upon any witness who is a cleric. We have carefully called into court professors of biology and zoology in non-Catholic Universities, most of them unbelievers in religion of any kind; only two out of more than twenty witnesses quoted are known to us to profess membership in any church. We are quite prepared to be told that in spite of appearances all these witnesses are really tools of the Jesuits—perhaps even Jesuits in disguise. Thus Haeckel in the *Problem of Man* calls his scientific opponent Prof. Reinke a "Protestant Jesuit" (See *The Latest about Haeckelism*, p. 6.); in his answer to Brass (*Berliner Volkszeitung*, December 1908) he speaks of his antagonist's "jesuitical misrepresentations;" and in dozens of other passages in his writings the jesuitical scare makes its appearance, now in one form, now in another. If not Jesuits, his opponents must at least be some kind of crypto—"unscrupulous theologians" and "religious obscurantists"; otherwise they would never dream of saying a word against Haeckel, "the acknowledged leading biologist of the world." In any case we can claim to have done our best to secure the truth about the Haeckel case from the most objective sources we know of—and what more can a poor man do?

THE KEPLER BUND AND BRASS'S ATTACK.

At this point our correspondent proceeds to give us his version of the Brass-Haeckel controversy:—

"Dr. A. Brass, who is nothing else than a lecturer of the Kepler-Bund—a sort of Christian Evidence Society masquerading as a scientific society—in a lecture in 1908 stated that Haeckel had so far tampered with his figures as to put a human head on an ape-embryo and vice versa; and this in spite of the fact that he

had personally shown Haeckel the correct illustrations. Haeckel disdainfully replied that this was 'an audacious lie'; and later showed that he never had any such communication with Dr. Brass; that the illustrations complained of were accurate copies by well-known embryologists, and that he had not drawn them himself at all. Dr. Brass then amended his charge. He then stated that Haeckel had cut off the embryo of a macacus (tailed monkey) and turned it into a tailless ape (Gibbon). Haeckel hereupon, while denying expressly the truth of the charge, published his famous confession—that six or eight per cent of his drawings were falsified. A thrill of horror then ran through the religious world. 'Naturally the shudders (as Mr. J. McCabe says) were not told that Haeckel spoke in the most patent irony, and admitted having done only what embryologist illustrators were in the habit of doing, including Dr. Brass himself.' "

Comment.—We have already covered the ground of this statement, with the exception of the following points:—

(1) Our correspondent opens by repeating the slanderous attack of the monistic press on the Kepler-Bund. The Kepler-Bund is one of the largest, if not perhaps the largest of the Natural History Societies in Germany. The writer in *America*, already quoted, declares that "it is in some respects analogous to our [American] A. A. A. S.; it has no religious affiliation, and pursues purely scientific purposes. Among its members are men like Valentiner, Berberich, Reinke, Branca, whose reputation is international." What the aims of the Kepler-Bund are will best be gathered from its own rules and regulations, not from monistic imputations. These rules and regulations make it quite clear that the "Bund" has for its

main object "the furtherance of the knowledge of nature;" that it insists on "freedom of science" (*Freiheit der Wissenschaft*) etc.—things which the Monistic Alliance seems to claim as its own exclusive monopoly. The Kepler-Bund grew out of a strong reaction against the tyranny exercised by Haeckel and his Monistic Alliance. According to Haeckel, Natural History has proved that the "central dogmas" of religion, viz. God, the soul, and free-will, are false (See *Riddle*, cheap ed., p. 135); he therefore who understands nature rightly must be an atheist; he who is not an atheist cannot really understand anything of nature. Against this harsh dogmatism the Kepler-Bund endeavours to show, by positive work, that between nature-study and belief in God and religion there is no such opposition. Natural History in itself does not declare either for or against religion; the religious convictions of mankind are not touched, but are left absolutely free by the results of modern science. (See *Die Welt*, Vol. I, 1909, *passim*; *In the Interests of Science*, p. 56 sq. etc.)

(2) Brass denied having made the statement that he had shown the correct figures to Haeckel. In the newspaper report on Brass's first lecture (which inaugurated the Brass-Haeckel controversy) a remark to this effect was added, that "Brass himself had at that time made the correct drawings for Haeckel." Brass immediately declared that his speech had not contained these or similar words. They were due to a gloss of the newspaper reporter, whose account had not been checked by himself. But in order to discredit Brass, the incorrect report was made unfair capital of by Haeckel and his supporters (e. g. H. Schmidt). Brass himself complained later on that "in spite of my correction published long ago, [they] rake up obstinately this misunderstanding of a newspaper reporter" (*In the Interests of Science*, p. 33).

(3) We have shown that the illustrations complained of were not accurate copies, and that Haeckel must have known it.

(4) Brass did not amend his accusation about the change of heads ; he reasserted it more definitely, and produced plates to prove it. The charge is moreover fully confirmed by the independent witness of Keibel [See Part I]. What Brass did was to prove his accusation to the hilt, and add others to it.

(5) Brass is not a lecturer of the Kepler-Bund in any sense which deprives him of his independence as a zoologist of credit, though not of eminent fame.

(6) We have to pass a stricture on the last sentence quoted from Mr. McCabe. The horror, we are reliably informed, was not only in the "religious world," but in the scientific world as well. Secondly, there was no concealment, as far as we know, of what Haeckel said or meant. It is not true to say that Haeckel spoke in irony. Irony means saying one thing while you mean the contrary. It is strange that Mr. McCabe, who otherwise—to judge from the translation of several of Haeckel's works published under his name—seems to have mastered the German language fairly well, could so completely misread Haeckel's declaration. There is certainly no trace of irony to be found in Haeckel's words (*Berliner Volkszeitung*, quoted before). Haeckel simply says that he has done what Brass charges him with ; but he maintains that this is not an objectionable way of acting—in proof of which he alludes to all other embryologists, etc., as doing the same. If there is irony here, it is the irony of fate : —that the dogmatist in his conclusions should be proved the forger in his premises ; that the denouncer of religious obscurantism should be convicted of anti-religious obscurantism—caught red-handed in the very act.

Nor was the fact concealed from the religious world that he only admitted having done what embryologist illustrators were in the habit of doing. As proof that there was no concealment, we turn back to an account of the case which was published in the "religious" paper *America*, and to another published in the "religious" paper *Rome*, at the time, and reproduced in *THE EXAMINER* of April 10th and August 14th, 1909. There we find the whole story given complete, including the very text of the chief documents on both sides. As far as we know, the whole case was the public property of the papers except in England, where a regular policy of suppression seems to have prevailed among the non-Catholic press. At least those who watched the papers failed to come across anything like a divulgence of the affair. We have purposely made use of quotations from the old files of *THE EXAMINER* in order to show that Mr. J. McCabe's insinuation of suppression in the "religious world," though highly characteristic of him, is gratuitous and false.

HAECKEL'S CONFESSION.

Our correspondent proceeds :—

"Now the usual clerical version of the story is that Haeckel was forced to confess under pressure from forty-seven leading scientists of Germany. This is quite the boldest of inaccuracies. Haeckel's statement appeared in the Berliner Volkszeitung of Dec. 29th, 1908."

Comment.—We suppose by the last sentence he means to prove that Haeckel's confession was printed spontaneously, before the circular of disapproval of "the forty-six" was published. This is undoubtedly a fact. We have never come across any attempt to attribute Haeckel's confession to the pressure of a document which came after it, and was in fact a pronouncement on it. If we did, we should feel

bound to call it a "clerical error," at least, if not a "clerical version." In the accounts we have read, the confession and the verdict of "the forty-six" have always held their right chronological place.

THEOLOGIAN'S ?

Here by way of parenthesis our correspondent remarks :—

"You say that Dr. Paulsen, a Protestant Professor of the Berlin University, and other professors, among others Wundt, Chwolson, Loofs, Adickes, Branca, speak in contemptible terms about the methods of Haeckel. I should like to remind your readers that in the list just quoted there is not one biologist or zoologist, with perhaps the exception of Branca, an obscure zoologist who is as illustrious as he is unknown. The rest are theologians. Prof. Loofs, for instance, is in Germany as bitter an opponent of Haeckel as is the Rev. Dr. Ballard in England."

Comment.—How can our correspondent say this? The one and only theologian among the six professors named is Loofs, professor of Protestant theology at the University of Halle. Paulsen, though personally a believing Protestant (?), is well known as professor of philosophy in Berlin; Wundt, professor of psychology in Leipzig; Chwolson, professor of physics in St. Petersburg; Adickes, professor of philosophy in Kiel; Branca, professor of geology and palæontology in Berlin.

(2) "There is not one biologist or zoologist among them except Branca." True; but Haeckel has written on many other subjects besides biology and zoology. In his popular writings Haeckel treats of a number of heterogeneous subjects quite outside his special branch; subjects in which he is as much a layman as many of his readers. The abovenamed savants did not imitate

Haeckel by discussing subjects of which they had no intimate knowledge. They confined themselves to Haeckel's methods and pronouncements in branches where they were acknowledged specialists. Paulsen and Adickes criticised his philosophical, Loofs his theological, Wandt his psychological, Chwolson his physical, Branca his biological methods, especially those connected with his own peculiar branch of learning.

(3) "Branca, an obscure zoologist who is as illustrious as he is unknown," says our correspondent. This statement is simply outrageous. Every German tyro in palæozoology knows him. He is quoted as an authority by English writers, for example, frequently by Geikie. Even if we knew nothing else about him, the very fact that he is Director of the Geologico-palæontological Institute of the University of Berlin would be sufficient to mark him off as one of the leading members of his profession. But we have also his standard zoological works on fossil *Cephalopoda*, *Fishes*, and *Mammals*.

Our correspondent ought really to confine his statements within the limits of his knowledge !

THE FORTY-SIX.

Our correspondent now returns to the main point :

"Let us see what part these forty-seven scientists took in the matter. The Kepler-Bund issued a circular to the leading scientists of Germany, calling on them to give their opinion in the matter. Nearly all the embryologists and anatomists signed the statement—among others Weismann, Wiedersheim, Bonnet, Boveri, Kollmann, Hatschek, Flechsig, Waldeyer, Korschelt, Hertwig, Lang, Plate, Pfeffer, Rabl, Rückert, Rhumbler, Ruge, Schwalbe, Goette, Chun, etc. But what they said was that though they did not like [according to the German original, they did not approve of—Ed.

Ex.] *the kind of schematising which Haeckel practised in some cases, they, in the interests of science and the freedom of teaching, condemned in the sharpest manner the attack of Brass and the Kepler-Bund on Haeckel.*"

Comment.—Except for substituting for the weak and incorrect expression "did not like," the stronger and correct expression "did not approve of," we have embodied this statement complete in our previous history of the case. We have explained the meaning both of the condemnation of Haeckel's methods and of the condemnation of the Kepler-Bund's methods. This item does not tell for but against Haeckel. Nay, in spite of its weak form, it is all the more valuable because it was so reluctantly given. [The number of the signatures is 46, not 47].

(2) It is not true that "*nearly all the embryologists and anatomists signed the statement.*" The total of "ordinary professors" of anatomy and zoology* in the German universities is forty-eight, of whom only twenty-four signed—exactly one half; although all of them, we believe, were *asked* to sign. Among those who held aloof were some first-class authorities e. g., O. Hertwig of Berlin, Ludwig of Bonn, Spengel of Gießen;—names well known all over the world. Beside the "ordinary professors," there are a good many—together 99—"extraordinary professors" and "lecturers" (Privatdozenten) of anatomy and zoology at the Universities. Not a few of them are acknowledged to be first-class authorities in their subject, and all of them certainly belong to the group of "embryologists" or "anatomists" in the German Universities. We do not know whether they were invited to sign the

* "Professor of embryology" is a term not in vogue in the German Universities, the subject being a subdivision of Zoology Botany or Medicine. "Ordinary professors" mean men who hold the highest official position in their own department of teaching.

declaration ; but the fact that none of them did sign it, makes the remark of our correspondent appear all the more grotesque. It is overdone if we consider only the number of ordinary professors; but it becomes an enormous exaggeration if we take into account the whole number of the professional zoologists and anatomists.

HAECKEL DEAD !

Our correspondent continues :—

"Yet in the face of such a document 'religious journals'—writes McCabe in the Literary Guide—the journals which are always wondering how man can possibly be truthful without their assistance—are assuring their readers all over the world that Haeckel is morally and scientifically dead, and has been condemned by German science."

Comment.—We must plead guilty of having said the same—that is, morally and scientifically dead as regards his personal character, and in the eyes of his learned contemporaries ; though, it would seem, still very much alive in the eyes of his worshipping followers among the general reading public, and among the popularisers of his works. *Having made this confession I might perhaps feel myself annihilated, were it not that there stand at my side in the prisoner's dock large numbers of others—not only editors of religious journals, but also many non-religious scientists, who have just been giving their testimony in the witness-box. The evidence for the scientific and moral deadness of Haeckel is strong enough to convince any average coroner's jury that the object before them is a corpse. The document of "the forty-six," far from providing any counter-evidence that he is alive, forms one of the items of evidence against it. For as we pointed out before:—However mild and weak its*

condemnation, it is still a condemnation, and therefore counts *not for but against* Haeckel's reputation.

THE THIRTY-SEVEN.

Our correspondent next proceeds with the Brass-Haeckel story :—

"Not content with the failure of Brass, the Kepler-Bund again attempted to draw up another document against Haeckel. Thirty-six men signed it, some of them of great distinction in the world of science ; but the men of real distinction who signed it were astronomers, geologists, botanists, lawyers, etc., but never embryologists. Their judgment on the point was absolutely worthless ; and indeed they did not pretend to be able to judge it."

Comment.—We find on examination that the number of those who signed was 37, not 36. Twenty-six are well known representatives of the different branches of science: for instance, zoologists (Hamann, Knauer), botanists (Reinke, Kny), geologists (Branca, Berendt), to mention only a few names. The other eleven were not specialists in science.

(2) But even so, the question arises : What qualifications are required to form a sound judgment on such a matter ? If it were some complicated question, only intelligible by close microscopic observation and high technical knowledge, the situation would be different. Here in Haeckel's case the matter is much more obvious. It is a simple question whether Haeckel has invented pictures, and put them forth and argued from them as if they were not invented ; whether in copying other people's pictures he has copied them faithfully, or altered them considerably to suit his theory. It does not require a shoemaker to see whether two shoes are the same size or a different size. It does not require a carver to see whether one carved stone is a true

copy of another. When once the question is proposed and the objects placed before him, any man with the ordinary use of his senses can form a judgment on such simple issues. But it is a favourite dodge of Haeckel and his followers to discredit in this way anyone who happens to come in conflict with their contentions: "This affair belongs to embryology, and therefore you, who are not embryologists, are incompetent to form a judgment in the matter." Even if their opponent happened to be an embryologist, they would still discredit him if he retained the slightest vestige of belief in God, free-will or the human soul. He would immediately be dubbed a theologian, a clerical obscurantist, whose dualistic superstitions deprive him of the free use of his reason. Haeckel's pages are peppered over with this sort of "ruling out of court," and our correspondent shows himself an apt pupil in this regard.

(3) If our powers of judgment were decided by the principle that:

"Who drives fat oxen must himself be fat"
—or in other words, that one must be a specialist in embryology before judging of a fraud connected with embryology—the result would be an awkward dilemma. We cannot speak positively of our correspondent's qualifications; but the chances are, he is not an embryological specialist. Similarly with Mr. McCabe, on whose authority in the Haeckel case he seems to rely. Mr. McCabe, we know, was during his youth and early manhood a Franciscan friar; a member of the class described by our correspondent as "unscrupulous theologians" and "religious obscurantists." And in his own autobiography he shows how far removed from the modern "scientific" his education was. Surely his sudden change from a "clerical" into a "rationalist" would not magically constitute him an embryologist,

We learn from the pages of *Who's Who* that he uses the microscope as a "recreation." Still that would hardly qualify him as an expert. Nevertheless he has had the boldness to write a book on *Evolution* claiming to be scientific ; to stand up and answer Haeckel's eminent scientific critics ; and to sit in judgment on the question of Haeckel's "frauds and forgeries." According to our correspondent's rule, we should have to decide that, not being an embryologist, Mr. McCabe's judgment on that case was "absolutely worthless" like that of the thirty-seven—although we could hardly add that he "did not pretend to be able to judge it."

(4) If these thirty-seven, or at least "some of them" as our correspondent generously concedes, are "of great distinction in the world of science," how could they be so utterly foolish as to sign a document giving a judgment on a point on which they did not pretend to be able to judge ? This would be the acme of stupidity. They did indeed pretend—and with excellent reason too—to be able to judge of the Haeckel case ; and their judgment is no more "absolutely worthless" than that of their 46 colleagues, who signed the first document.

COUNTER-CHARGE AGAINST BRASS.

Our correspondent adds :—

"Prof. Rabl in the *Frankfurter Zeitung* of March 5th, 1909, also Prof. Forel and Hertwig emphasised the great services of Haeckel to science, and showed that Dr. Brass had committed precisely the same fault he brought against Haeckel." "Brass," says Prof. Rabl, "is a mere layman in embryology ; and university students were warned not to trust to his illustrations."

Comment.—We have dealt already (in Part III) with the question of Haeckel's services to science, by showing that they were limited to the field of systema-

tic zoology, and do not support him in the matter now under discussion.

(2) Brass in his defence (*In the Interests of Science*, p. 80 sq.; see also *Ape-Problem*, 2nd edition) completely refutes the charge of falsifying illustrations. The special instances Rabl mentions are printing-mistakes expressly mentioned at the end of the book among the "errata." The misrepresentation of one or two of the copied illustrations was—as distinctly stated by Brass—due to the impossibility of correcting the proofs, on account of the unavoidable absence of the author. Where is the parallel with Haeckel's premeditated falsifications?

(3) As regards Rabl's (also Hertwig's) condemnation of Brass, there stand against it first-class testimonials in favour of Brass's scientific qualifications from other professors of science of high standing viz., of Leuckart, Waldeyer, etc. Moreover, if the case against Brass were so bad, Haeckel himself or some of his followers would certainly have retaliated by issuing a counter-pamphlet on "Brass's frauds and forgeries," so as to show that "people who live in glass houses should not throw stones." But nothing of the sort appeared. This being the case, merely general accusations, coming from a party who are noted for their tactics of crushing unpleasant adversaries by personal abuse, hardly count for much.

(4) Finally, it matters little whether Brass is a first rate, or only a second or even third rate authority in his special branch of learning. The point at issue is whether his charges against Haeckel are true or false. We have already shown that he has substantiated his accusations with irrefutable proofs.

THE LITERATURE.

Our correspondent then tells us that:—

"In the Brass-Haeckel controversy all documents on

both sides are given by Dr. Schmidt's *Haeckels Embryonenbilder*, and Prof. Haeckel's *Sandalion*. Both are published by the *Neuer Frankfurter Verlag, Frankfurt a. M.*"

Comment.—Schmidt, former general secretary of the Monistic Alliance, is an altogether uncritical eulogist of his master Haeckel. His writings are not of the least weight outside the circle of Haeckel's followers; they are of use only to one who wishes to make a special study of bad logic, strong language and vile abuse. In his own fatherland his reputation is gone, even with his dearly beloved Monistic Alliance. For when Prof. Chwolson, in his famous *Two Questions addressed to the Members of the German Monistic Alliance* (Braunschweig, 1908) had conclusively proved Schmidt's highly objectionable way of treating him (Chwolson) in some literary affair, Schmidt had to resign, or else was dismissed in disgrace from his post.

As to our correspondent's assertion that Schmidt gives all documents on both sides, it will suffice to make a distinction as follows:—All documents on Haeckel's side, yes; all documents on the other side, no. Among the documents on the side opposed to Haeckel, Brass's writings certainly occupy the first rank, because he took the lead in the last campaign against Haeckel. After the declaration of the "Forty-six" Brass brought out a counter-declaration, criticising in a very able manner the standpoint of the "Forty-six." We look in vain for this important document of Brass in Schmidt's *Embryonenbilder*; but in the place it ought to occupy we find the following remark (p. 54):—"What Brass himself had to say with regard to the declaration [of the "Forty-six"], may be read by anyone who likes to do so, in the supplement to the *Norddeutsche Allgemeine Zeitung* No. 49. Here I refuse to give space to his babble." This passage is more than sufficient to dis-

credit the impartiality of the man who is declared to give "all documents on both sides."

SCHEMATISING.

As a final remark our correspondent adds :—

"I must explain briefly that schematising in scientific illustrations is a procedure adopted by most workers ; and if there is any dispute about it, it is only a question of opinion, generally of an academic interest. But no charge of fraud can be brought against any scientist for doing so. It is only the very malicious or ignorant who can believe such things."

Comment.—We have explained several times, and here explain again, that schematising means the making of *conjectural* figures, to show *by deduction* what would exist if the writer's theory were true. No one objects to this, so long as the figures are clearly put forth as schematisations, and labelled and spoken of and used in the text as merely conjectural. Haeckel's crime consists essentially in having put forth schematised figures without label or acknowledgment, thus giving the unavoidable impression that they profess to represent real objects—an impression confirmed by the fact that they are treated as real objects and used as the basis of *inductive* proofs in the text. It is this which turns Haeckel's doctorings into "frauds and forgeries."

Secondly, our correspondent cannot be so simple as to imagine that the obvious principles which determine whether an illustration is honest or dishonest, should not be familiar to those numerous professors who have attacked and condemned Haeckel—not in a cursory or indiscriminating manner, but by a careful examination of Haeckel's plates as compared with the originals, or with known observations. The witnesses we have cited cannot certainly be called ignorant ; and since they

depend on tangible facts on paper before them, their verdicts stand objectively, and need not be attributed to malice. They might have felt what is called "a malicious pleasure" in bringing a very old offender to book. But if so, this would be a personal feeling only, and would not interfere with the validity of their conclusions.

CONCLUSION.

Except for the opening paragraph which we have summarised, and the final paragraph which simply contains a challenge of our charge against the Rationalist Press Association for its circulation of Haeckel's books, we have now given the whole of our correspondent's letter of May 24th, embodying his complete statement in defence of Haeckel.

From what has been said it is evident that our correspondent's letter contributes nothing to a sound knowledge of the Haeckel case. It would, if accepted as "the true version," only involve the matter "in the double obscurity of erroneous information." The arguments it contains have, moreover, done nothing to redeem Haeckel's reputation or palliate his offence; nothing to debilitate, still less to dispose of, our original charge of "shameless frauds and forgeries."

PART V.

THE RATIONALIST PRESS REPRINTS.

In the foregoing pages we have seen what the accusation against Haeckel is, and how far it is substantiated. Our conclusion is that Haeckel has been convicted of falsifying plates and supporting arguments by them in a way which justifies the indictment of "shameless frauds and forgeries." We have still in contemplation a larger study of Haeckel's writings, which will show that not only these frauds and forgeries, but also a large amount of other kinds of falsity is made use of in such a way as to give to the position of unbelief a plausibility which, when stated fairly, it would not possess; and therefore his works are calculated to "cheat people out of their religion." But for the present purpose we content ourselves with the foregoing proofs; and in the light of them we proceed to our second question, namely: Given that the charge against Haeckel is fully substantiated, how far is the Rationalist Press Association implicated through their patronage of Haeckel and the circulation of his books?

PRELIMINARY REMARKS.

Before examining the indictment it will be well to define our terms. A simple statement of untruth in words is called *a lie*. If a lie is perpetrated not merely by words but by methodic action it is *a fraud*. If the action consists in creating a false object and putting it forward as a true object, we call it *a forgery* [a forged signature, a forged letter, a forged inscription, a forged picture, and so on]. A lie, a fraud, a forgery always imply conscious and deliberate action with the purpose to deceive. Where the deception is perpetrated out of ignorance with no intention to deceive, the fault is called a blunder or a mistake. Now Haeckel has

been convicted *objectively* of frauds and forgeries. No one could accuse him of that degree of ignorance which would reduce his falsities to mere blunders or mistakes. He has acknowledged deliberateness, and tried to justify it by saying that all embryological illustrators do the same—which is merely a misrepresentation vainly put forward to cover the fraud. About the Haeckel case there seems no room for clash of opinion. In the light of the foregoing evidence, we regard it as a closed question.

By way of further explanation we may add that Haeckel's *forgeries* are strictly confined to his plates, which he has falsely invented and put forward as if they were genuine. But the *fraud* extends also to the written text—whether in the form of notes attached to the pictures, or of statements and arguments based on them or deriving a bogus support from them. The making of the plates and the writing of the text go together as part of the same scheme of fraud.

This being premised, we know what we have to look for in the volumes circulated by the Rationalist Press Association. It is not our business at present to collect together all the many other objectionable features of Haeckel's books. Our object is merely to find out how far and in what way Haeckel's proved falsities intrude themselves into the reprints of the R. P. A. : First, how far the *forgeries* are reproduced in the form of plates; and secondly, how far the *frauds* connected with the plates find place in the text—no matter whether the plates themselves are reproduced or not. For unfortunately the mischief does not stop at the pictures ; in fact, the real mischief lies in the false arguments which are based on them, or which derive an appearance of truth from them.

We have already observed that our treatment of the whole subject would become far clearer by aid of the plates themselves, especially when placed side-by-side.

with the originals of which many of them are falsifications. In reprinting these articles we have provided a small selection of the most conspicuous instances, in which the fraud or forgery becomes manifest at a glance. For the rest, we must enter into a certain amount of description in order to make each point clear.

THE REPRINTS.

Let us now see what the Rationalist Press Association has been doing for the circulation of Haeckel's books since the date (1908) at which the whole Haeckel exposure was in full possession of the public as a closed question.

The list of books published by the Association, as given on the covers of some of its most recent prints, includes the following works by Haeckel :—

- (1) *The Wonders of Life.*
- (2) *The Riddle of the Universe.*
- (3) *The Evolution of Man* (Anthropogeny).
- (4) *Last Words on Evolution.*

All these works continue to be issued and advertised by the R. P. A. and offered for sale, and are scattered broadcast among the booksellers' shops, and are bought and read by thousands. With a copy of each of them lying before us we can now set to work.

A. THE WONDERS OF LIFE.

Can be at once dismissed. It contains no pictures, and treats of matters which mostly lie outside our present scope. The points which we might have to criticise all recur in the other reprints, and need not be handled here.

B. THE RIDDLE OF THE UNIVERSE.

O, the Riddle of the Universe we possess two editions; one dated 1907 (before the Brass-Haeckel controversy

brought the exposure of Haeckel to a climax), and one dated 1913, long after the exposure had become the public property of the whole world. Our references are to the latter. Neither edition contains any pictures; but in several cases the substantial effects of fraud and forgery appear in the text.

Haeckel's chief object in the first few chapters of *The Riddle* is to get rid of all dividing-lines between man and beast. It is a recognised fact that man by structure belongs to the vertebrate type; and the general similarity of his organic parts to those of the vertebrate animals, and particularly the anthropoid apes, is an obvious truism. Haeckel, however, wants to push this similarity so far as to draw the conclusion that man must have descended, by gradual evolution, from the vertebrate animals, and ranks merely as one amongst them [a primate]. In doing this he has, in certain points, supported his argument by references to plates which, if true, would greatly countenance his contention; but which on examination are found to be false—sometimes pure inventions, sometimes copies exaggerating the likenesses and suppressing or minimising the differences.

I. THE LIKENESS OF EMBRYOS.

On page 53 (cheap edition, p. 23) Haeckel writes as follows:—

“The substantial similarity in outer form and inner structure which characterises the embryo of man and the other vertebrates in this early state of development is an embryological fact of the first importance. There is but one explanation of it—heredity from a common parent-form. When we see that at a certain stage the embryos of man and the ape, the dog and the rabbit, the pig and the sheep, although recognisable as vertebrates, cannot be distinguished from each other,

the fact can only be elucidated by assuming a common parentage. And this explanation is strengthened when we follow the subsequent divergence of these embryonic forms. The nearer two animals are in their bodily structure, and therefore in the scheme of nature, so much the longer do we find their embryos retain this resemblance; and so much the nearer do they approach each other in the ancestral tree of their respective group, so much the closer is their genetic relationship. Hence it is that the embryos of man and the anthropoid apes retain the resemblance much later at an advanced stage of development, when their distinction from the embryos of other mammals can be seen at a glance. I have illustrated this significant fact by a juxtaposition of corresponding stages in the development of different vertebrates in my *Natural History of Creation* and in my *Anthropogeny*." [So far Haeckel].

The plates in other works, thus referred to, are precisely those which fell under the condemnation of Rüttimeyer in the first, and more specially of His and Semper in the second exposure [See Part I]. Under pressure of these exposures, the plates seem to have been at least partially suppressed in the later editions of *Anthropogeny*. But some of them still remain in the complete edition of the English *Evolution of Man*, and are referred to in the R. P. A. abbreviated reprint of *The Evolution of Man* (Vol. I, p. 155) especially in the foot-note.

These references to illustrations occurring in other works pretend to provide support from nature for the alleged identical appearance of the different embryos; and anyone looking up the plates would be convinced that the argument contained in the text was proved to demonstration. When once the false plates are discredited, the argument falls to the ground. That Haeckel's contention, both in plates and in text, is false to fact

has been conclusively shown by those who exposed the pictures, and also by the following specialist authors:—

(1) Lieberkühn, Professor of Anatomy at the University of Marburg [See Dennert, *The Truth about Ernst Haeckel*, p. 33], says: "Professor Haeckel maintains in his popular writings that the embryos of man and animals in their earlier stages cannot be distinguished from each other. Haeckel himself may be unable to see the difference; but it does not follow that others are equally incapable. You may, if you like, mix up all sorts of embryos in one pot; and I am ready to tell you the parentage of each and every one of them."

(2) Fleischmann, Professor of Zoology and Comparative Anatomy at the University of Erlangen, in his *Theory of Descent* (Leipzig 1909) on p. 245, says: "Everyone who reads this passage in Haeckel will imagine that an undistinguishable likeness obtains among the embryos of vertebrates—all the more because Haeckel has been repeating the statement for thirty years. Scientific men, however, were sharply opposed to it from the very first moment of its publication; and W. His (See *Our Bodily Frame*) demonstrated its incorrectness, by word and picture, as early as 1874. The progress made in evolutionary investigation has now positively proved Haeckel's assertion to be wrong. I do not believe that any scientist, who has devoted his life to the study of animal development, will subscribe to the sentence of Haeckel just quoted. Through the exact observation of the embryonic development of numerous vertebrates, it has been securely established that the specific marks of different animals are apparent, even in the youngest embryos, with the same clearness with which the eggs of different birds can be distinguished by an expert."

On p. 246 Fleischmann adds: "I am convinced that Haeckel would feel it an insult to be told that he

could not distinguish a young human embryo from that of a dog, a pig or a bird—a point which can easily be settled by any fairly experienced embryologist. The differences were already, even twenty years ago, so universally known that the anatomist, W. Krause of Göttingen, badly compromised himself, because in 1875 he labelled a chick embryo, sent to him by one of his former students, as if it were the embryo of a man in an early stage."

(3) J. Ranke, Professor of Anthropology at Munich, in his standard work on *Man* (Leipzig 1894), Vol. I, p. 154, says:—"As in the first germs—the ova and spermatazoa—so also in every later stage of development we can recognise the specific properties which distinguish the different developing bodies from their cognate forms."

(4) W. von Bischoff, one among the greatest Anatomists of the world, and Professor at the University of Munich, in a meeting of the *Barvarian Academy* on January 8th, 1876, showed careful drawings of human and various mammalian embryos belonging, as far as possible, to that early stage of development in which the gill- or visceral arches of the head are still visible. In the *Proceedings* of the Academy (1876) No. 1, p. 1, we are informed that "they show important characteristic differences in their entire configuration; and are consequently very unlike the corresponding illustrations of Haeckel in his *Anthropogeny* (Plate V, Second Series). They decidedly conflict with Haeckel's statement on p. 255 of the same book—namely, that the embryo of man, even at this stage of development, cannot be distinguished from that of the higher mammals."

Prof. Bischoff further states that, even as regards the earlier stages of development, he had never observed such an identity of form among different mammalian embryos as was given by Haeckel in the first series

of the above-named plate ; and the same holds good of the facial developments of the embryos of man, bat, cat and sheep given in Plate I [=Plate XXIV in the 6th German edition].

Here, by way of parenthesis, it will not be out of place to add Bischoff's views regarding the *ova* of man and the higher vertebrates. Haeckel has not given any false plates or figures of them, the objects being too small to allow of any glaring misrepresentation. But in the *Riddle* (cheap edition, p. 22) he says :—"The human ovum...has just the same characteristic appearances as that of all other viviparous organisms." Against this assertion the abovementioned report declares that Bischoff presented "drawings, made as carefully and exactly as possible, of the *ova* of man, cow, dog, pig, rabbit, cat, rat, mouse and mole, all of the same magnification of 400 diameters, which exhibited important differences, as well in the size of each ovum as in the thickness of the vitelline membrane, and especially in the composition of the yelk."

(5) O. Schultze, Professor of anatomy at the University of Würzburg, in his *Epitome of the Development of Man and Mammals*, edited at the instigation of Kölliker as a revised edition of the latter's classical *History of Development*, states on p. 122, that "as regards the development of man in the first week of gestation we are absolutely in the dark : of the second week some embryos have been described which go to prove that the human development in these earliest stages shows several distinctive features."

(6) Plate V. (the one first mentioned by Bischoff) was also censured by His and Semper as full of falsities [See our first part]. The reference is to the first edition of *Anthropogeny*. In the sixth German edition, a collection of embryos—most of them "schematised" in Haeckel's usual fashion—is given in plates VIII—

XIII. But none of these large plates are reproduced in the R. P. A. cheap reprint of *The Evolution of Man*.

Our conclusion is that the statement cited above from the *Riddle of the Universe*, which would certainly seem demonstrated to the reader so long as he relied on Haeckel's illustrations, proves to be utterly false as soon as the falsity of the illustrations has been exposed. The statement, in short, stands solely on the foundation of the false plates, which are supposed to represent facts of nature, but really misrepresent them.

II. THE ALLANTOIS.

The second passage occurs on pages 54-56 (cheap edition, pp. 24-25) of the *Riddle*, where the *allantois* of a human embryo is described as a vesicle (or small bladder), "a vesicular bag;" "a vesicular structure." On page 54 Haeckel writes: "This vesicular bag, filled with water, grows out of the hind gut of the embryo of the amniotes, and is nothing else than an enlargement of the bladder of their amphibious ancestors. . . . The formation of . . . the *allantois* is just the same, and is affected by the same complicated growth in man as in all the other amniotes; *man is a true amniote*." Finally, he refers to a description and illustration of this point in *Anthropogeny* Chapter XXIII (p. 56). The illustration which, if true, would bear out this statement, occurred in the first edition of the *Anthropogeny*, and was censured by His in the second exposure (See Part I).

In the R. P. A. edition of the *Anthropogeny* (Vol. I, p. 164) we find a picture corresponding to this description. On examining it the reader will see, extending from the abdomen of the figure, a long cord with a large bulb at the end. This is the yolk-sac. Parallel with this he will find another and shorter cord with a small bulb at the end. This is meant for the

allantois. As a matter of fact the bulb has no real existence. The *allantois* ought to be a simple tube closed at the end without any expansion into a bulb.

To an ordinary observer this might seem a trifling matter. Yet on that small and fictitious bulb Haeckel builds his argument that "man is a true amniote"—merely one among those higher vertebrates which develop an "*amnion*"; whereas in truth it is just the absence of that small bulb which puts man in a place apart. Thus when the bulb is shown to be non-existent, Haeckel's argument on this point falls to the ground.

There seems to have been some tinkering with this illustration in various editions. Under the R. P. A. copy it is cautiously stated that "the *allantois* forms a large vesicle in most of the mammals." Nevertheless the picture itself is clearly that of a human embryo, and is so labelled—which makes the deception complete. Moreover, the statement that the human embryo has the bulb or vesicle is retained and emphasised in the text.

The following scientists witness to the falsity both of the picture and of the argument built on it :—

(1) His [See Part I] declares that in man "the *allantois* is *never* visible in the form of a vesicle."

(2) Stratz, in his *Natural History of Man* (Stuttgart 1904, p. 98) says: "From the ectodermal layer of the yolk-sac a small tube, ending blind, grows out into the pedicle. This formation is the *allantois*" [Observe : a *tube*, not a vesicle].

(3) Selenka, recognised by Haeckel as an authority of the first rank, in his *Studies of the Anthropoids as regards the development and build of the skull*, Part III, p. 207 (Wiesbaden 1900), says: "In man and the anthropoid apes the development of the *allantois* into

a vessel-carrying vesicle does not take place. Only a poor tube-shaped endodermal rudiment is formed."

The conclusion is that Haeckel here maintains an argument which would appear convincingly true if the illustration were true; but which is seen to be false as soon as the illustration is corrected.

III. THE GENEALOGICAL TREES.

In the *Riddle* page 68 (See cheap ed. p. 30 seq.) Haeckel describes the genealogical pedigree of man's descent from the lower animals which he considers to be "substantially correct" (p. 68). "For the purpose of our monistic philosophy (he observes) it is a matter of comparative indifference how the succession of our animal predecessors may be confirmed in detail. Sufficient for us, as an incontestable historical fact, is the important thesis that man descends immediately from the apes, and secondarily from a long series of lower vertebrates" (p. 69). He then gives an account of the lines of descent from which "their common origin from a single ancestral group follows incontestably" (p. 70). As regards the lines nearest to man, he says that "during the last twenty years a fair number of well-preserved fossilised skeletons of prosimiae and simiae have been discovered. In them we find all the chief intermediate members which complete the connecting chain of ancestors from the oldest prosimiae to man" (p. 71). He refers to the Java discovery of 1894 as "the much-sought missing link, supposed to be wanting in the chain of primates, which stretches unbroken from the lowest catarrhinae to the highest developed man" (p. 71). He concludes: "Thus by the discovery of the fossil man-monkey of Java, the descent of man from the ape has become just as clear and certain from the palæontological side as it was previously from the evidence of comparative anatomy and

ontogeny. We have now all the principal documents which tell the history of our race" (p. 71).

This emphatic and confident assertion is refutable in all its parts:—(1) First, the Java find is no longer viewed in scientific circles as the "missing link" which Haeckel so enthusiastically calls it. Among hosts of opponents to Haeckel's assertion we need mention only a few: Virchow, Ranke, Selenka, Keith, Lydekker, von Zittel, Branca and Klaatsch—all anthropologists of international fame. (2) The immediate descent of man from the ape is a theory now altogether discredited in scientific circles. Even by most staunch evolutionists man is viewed only as a branch-type collateral with the apes. (3) The alleged possession of "all the principal documents" and "all the chief intermediate links," is a grotesque exaggeration. (4) The genealogical tree which illustrates Haeckel's theory, and which gives the impression of a most convincing completeness, is made up largely of fictitious names filling up the gaps; standing for forms of life which have never been discovered, and whose existence is entirely unproved.

Although Haeckel, in certain places, expressly acknowledges that his construction of the tree of descent is in some parts hypothetical, here he leaves this concession out of sight, and speaks of the line of descent as "an incontestable historical fact." As the genealogical tree is not produced in the R. P. A. edition of the *Riddle* we cannot discuss it here, but shall do so later on in the *Last Words on Evolution*. We can however safely anticipate the result, and put Haeckel's treatment, as just quoted, among the "frauds" of the *Riddle*. There is no doubt that any ordinary reader would inevitably be misled thereby, without the least chance given him to detect the imposition.

These three instances might by closer search be added to; but they will suffice for our purpose because

they touch on the most important issues of this part of the *Riddle*: that is to say (1) the ontogenetic, and (2) the phylogenetic relations between man and the lower animals. The rest of the book carries us out of the region of zoology and physiology, and therefore falls outside our present scope.

PART VI.

FURTHER EXAMINATION OF REPRINTS.

IN this section we continue our examination of the R. P. A. reprints of Haeckel's works.

C. THE EVOLUTION OF MAN.

The *Anthropogeny* has been published by the R. P. A. in two volumes, under the title of *The Evolution of Man*. Of their reprint we possess the edition dated 1912. The work is considerably abbreviated; a number of pictures are inserted in the text, but the full-page plates of the original are omitted. We notice that Messrs. Watts and Co. announce a library edition which contains the full text and all the plates; but this work, although advertised on the covers of the reprints, is apparently not published in the name of the Rationalist Press Association. As the figures censured by Keibel are mostly found in the plates, they fall outside our present indictment, except so far as the arguments in the text are dependent upon them.

We may, however, mention in passing that some of the censured plates appear in other R. P. A. reprints:—

(1) Plate VII (Cf. 6th Germ. ed. pl. XII & XIII) showing the embryos of the hog, calf, rabbit and man,

is reproduced in Hird's *Easy Outline of Evolution*, p. 27.

(2) Embryos of the fish, dog, and man, appear on p. 92, and those of dog, tortoise and man on p. 106 of Clodd's *Story of Creation*. (Cf. 6th Germ. ed. pl. IX & XIII.)

In this way selected portions of the condemned plates fall under the patronage and circulation of the R. P. A. But we have quite enough to do in confining ourselves to the actual reprints of Haeckel.

FIVE POINTS.

While handling the *Riddle* (See above) we have already dealt with two points in the *Anthropogeny* :—

(1) The assertion on Vol. I, p. 155, that : “In the first stage of development . . . the embryos of all the vertebrates from the fish to man are only incidentally or not at all different from each other” ; and that : “In the second stage . . . the human embryo is still hardly distinguishable from that of the higher mammals” —also the foot-note referring the reader to six of the omitted plates. The falsity found in the *Riddle* is thus repeated, though more cautiously, in the *Evolution of Man*.

(2) The illustration in Vol. I, p. 164, of a human embryo exhibits an *allantois* ending in a bulb, which is not found in nature, and on which Haeckel builds an important but bogus conclusion in the *Riddle*.

Three other points can now be added :—

(3) In Volume I, p. 129, we read : “The human sandal-shaped embryo cannot at this stage be distinguished from those of other mammals ; and it particularly resembles that of the rabbit. On the other hand, the outer form of these flat sandal-shaped embryos is very different from the corresponding form of the lower

animals." This statement about the human embryo is entirely incorrect; and the plate which accompanies it in the full German edition is one of those which was exposed by Keibel [See Part I]. Keibel describes the figures as "products of the imagination, for which the embryos of [certain monkeys] have been made use of to a fairly large extent. The embryos of man at this stage (he concludes) have a totally different appearance."

(4) In Volume I, p. 177, and II, p. 305, there appear two pictures of apes in an erect posture, copied from other authors. These are misleading to the general reader, because he is not told that this posture is not a reality in nature. Careful writers act quite otherwise. Thus J. Ranke in *Der Mensch* (2nd edition, Vol. II) sometimes gives such erect figures in order to bring out clearly this or that part; but he always adds a note saying that the figure is "unnaturally stretched" thus warning the reader that apes are *not* upright animals (See pp. 4, 19, 79, 81). Haeckel serves his purpose better by abstaining from this remark.

THE MONERA.

(5) One of the most serious of Haeckel's false statements is that connected with what he calls the "*monera*." In order to establish the monistic philosophy, it is necessary to show the uninterrupted oneness of the whole universe under one universal law of evolution. Not only must all life, including man, have sprung from some first simple form of life, but this first simple form of life must have evolved by itself from non-living matter by "abiogenesis" or "spontaneous generation" (See *Riddle*, p. 27 and 131). Now it is evident, thinks Haeckel, that a real "cell" could not have been the first organism, because it is not simple enough. Real cells—in the now prevalent sense of the

word—have “at least two different organs or *organel-la*”; their matter (plasm) is “never homogeneous” (*Wonders of Life*, p. 59). Hence there must have been some earlier and “more elementary organisms” (*Anthropogeny*, Vol. I, p. 40). Haeckel claims that “these first living things” are still actually represented by the botanical order of *Cyanophyceae*—which he prefers to call *Chromaceae*—especially the genus *Chroococcus*. For the purposes of the monistic philosophy he calls them *monera*—“the simplest things we can conceive.” These *monera*, he declares, contain nothing but “homogeneous plasson”—“soft structureless plasson.” Even with “our finest chemical reagents and most powerful microscopes we can find no definite parts, no anatomic structure in it” (*Anthropogeny*, II-209; also I-49, and *Wonders*, 22,59). “The whole life of these homogeneous globules of plasm consists of simple growth and reproduction by cleavage” (*Anthrop.*, II-210). When they have attained a certain stage of growth, “the homogeneous globule splits into two halves—like a drop of quicksilver when it falls” (*Wonders*, p. 22). These *monera*, he concludes, are “of the utmost importance for the purposes of Evolution” (*Anthrop.*, II-209). They have “a special significance” (*Wonders*, p. 22) and are of “extreme importance” (*Wonders*, p. 61).

The biological professor on whom we rely has supplied us with an overwhelming refutation of this teaching, the details of which we reserve for our fuller treatment later on. He cites a standard *Textbook of Botany* by Strasburger, Jost, Schenck and Karsten (London 1912), besides the testimony of Kerner and Oliver, Strasburger and Hillhouse, Fischer, Zacharias, Heyler, Kohl and other specialists of the highest order, in express contradiction of every point. Finally, Reinke, who speaks of the “flippancy” of Haeckel in

discussing the *Chromaceæ*: "It is a dodge on the part of Haeckel to maintain that the cellular membrane of *Chromaceæ* and *Bacteria* is nothing but a physical surface-tension membrane. With this assertion he can throw dust into the eyes only of the inexperienced. It is a similar dodge when he speaks of chains of plas-tids or of catenal cœnobia. These are nothing but words by which he tries to produce in unskilled readers the impression that the majority of the *Chromaceæ* are of a different structure from the *Algae*—which is by no means the case. Now when Haeckel, in spite of all this, tries to turn the *Chromaceæ* into *monera*—in his own sense of the term—I ask you: Is this conscientious? Is this truth-loving? Is this scientific?" [*Haeckel's Monism*, p. 24, 25].

The pictures illustrating this point in the *Evolution of Man* (Vol. II, p. 209, 210) are utterly misleading to the general reader, because they convey the impression that the objects are perfectly homogeneous. We do not call the pictures "forgeries" because the fine features of such delicate objects simply cannot be shown on so small a scale. But they give a misleading support to the highly erroneous contentions in the text. As a matter of fact the *monera* are not simple globules of homogeneous plasm, but have a very complicated structure, and even a central body corresponding to a nucleus—all of which can be distinctly seen by the use of good microscopes and of good staining reagents. Even supposing Haeckel failed to discover this by his own earlier researches, he ought at least to have withdrawn his erroneous monistic argument when the truth had been made clear by others; and his persistence in putting forward the *monera*, as providing the "missing-link" between life and non-life which is simply essential for his monistic philosophy, amounts practically to a fraud.

D. LAST WORDS ON EVOLUTION.

This series of popular lectures, delivered in 1905, professes to be a summary presentment of the teaching of the earlier works—"the chief evolutionary conclusions advocated for forty years" (Preface). The R. P. A. reprint, translated from the second edition, bears the date 1910, or two years after the final exposure of Haeckel had become common property. It contains four items which fall within our present scope—two genealogical trees and two plates.

I. TREE OF VERTEBRATES.

Facing page 32 we find a "genealogical tree of the vertebrates" professing to trace the descent (or ascent) of man by gradual evolution through different stages of the vertebrates from the lowest forms of vertebrate animals. Of this tree the explanation given on p. 16 is as follows:—"The genetic relationship of all vertebrates from the earliest acrania and fishes up to man is proved in its main lines by the concordant testimony of paleontology, comparative anatomy and embryology. All competent and impartial zoologists now agree that the vertebrates are all descended from a single stem." On examining the tree we find running up the middle, as a main trunk, a column of 12 names in ascending order of structural development, and ending with man.

This certainly looks convincing. But when these names are examined it is found that the majority of them are pure inventions of Haeckel—conjectural fillings-in without any known animal, either fossil or existent, corresponding to them. On the next page we reproduce the main line of the pedigree as given by Haeckel, and side-by-side with it the same main line after the fictitious names have been eliminated. The reader is asked to compare the impressions given by

the two columns—how full the one, how empty the other :—

The Vertebrates.

HAECKEL'S TREE	THE REAL MEMBERS.
Man (<i>Homo</i>)	Man (<i>Homo</i>)
Ape Man (<i>Pithecanthropus</i>)	
Pro-Gibbon (<i>Prothylobates</i>)	
Lemur (<i>Prosimiae</i>)	Lemur (<i>Prosimiae</i>)
Proplacentals (<i>Mallotheria</i>)	
Promarsupials (<i>Prodidelphia</i>)	Promarsupials (<i>Prodidelphia</i>)
Promammals (<i>Promammalia</i>)	
Proreptiles (<i>Proreptilia</i>)	
Protamphibians (<i>Progonamphibia</i>)	
<i>Paladipneusta</i>	
Primitive fishes (<i>Selachii</i>)	Primitive fishes (<i>Selachii</i>)
<i>Archichrania</i>	
Provertebrates (<i>Prospondylia</i>)	

It is true that Haeckel in his *Riddle*, and occasionally elsewhere, states frankly that his genealogical trees are theoretical and schematic—as indeed it is obvious, in the present state of our knowledge, that they must be. I think he even, in some of his charts, indicates by a mark those forms which are hypothetical—he does so, for instance, in the “classification of the primates” in Appendix 3 of the *Last Words*. If Haeckel preserved this attitude throughout, all would be well. But in this matter he habitually plays a double part. For in his descriptive text, he argues as if all or nearly all his “hypothetical link forms” which fill up the tree were realities. He talks of the line of descent as “an incontestable fact”—even “an incontestable historical fact,” and claims that “we possess all the chief documents,” and all the “links of an unbroken chain” etc. (See *Last Words* p. 67, 77, etc.; also *Riddle*, passim). Such statements are absolutely false. They smother completely the hypothetical aspect of the subject under a weight of confident assertion, and thus inveigle the reader into supposing that it is all as true as Gospel. Such a method of writing is utterly deceptive.

Thus the impression given to the reader by the foregoing “genealogical tree” (p. 32) and its explanation (p. 16) is entirely misleading, just because he is not told what he ought to be told—namely, that out of the twelve direct ancestors only three have been discovered to exist even as fossils. On page 69 Haeckel further misleads his readers when he speaks of the “inseparable links of a long ancestral chain of which the most perfect link is man.” They may be inseparable links in the imagination of Haeckel; but in nature the great part of them have no known existence. Branca, a recognised authority on palæontology, says (quoted by Obermayer, op. cit. p. 370) that we know nothing about any tertiary animal ancestors of

man ; and this must be emphasized "against the assertions which Haeckel still continues to print, that we have already all the important fossil intermediary links which represent a coherent chain of ancestors from the oldest prosimians [lemurs] up to man. This is sheer imagination (*Phantasie*)."

Again on pages 67—68 Haeckel mentions five or six fossil forms which have really been discovered, and which he enumerates as among the ancestors of man. Yet if we look up these forms in the genealogical tree, we find that they all occur in the side branches, and therefore do not lead up to man. On this point Haeckel's own tree contradicts his text.

This genealogical tree has not figured in any of the "three exposures," because it has always been recognised by scientists to be purely hypothetical. Haeckel himself in his latest scientific work *The Series of our Ancestors* (Jena 1908, p. 6) openly confesses that "All ideas we can possibly form about the stem-history of any organism, even after the most critical investigation, are and must remain hypotheses." Likewise in his *Systematic Phylogeny* (Berlin 1894-96), a book written exclusively for his professional colleagues, Haeckel in Vol. I, preface p. VI. says :—"It is self-evident that our genealogical history is and ever will be a fabric of hypotheses . . . Only a small portion of the material resulting from these phylogenetic transformations, lies tangibly before us ; by far the greater part remains for ever hidden from our sight." These acknowledgments make Haeckel's popularising dogmatism the more manifestly insincere ; and his use of the hypothetical trees in the *Last Words* amounts practically to a fraud.

II. TREE OF THE PRIMATES.

In Appendix No. 4 we find a genealogical tree of the primates—an enlargement, so to speak, of a part of

the general tree. It contains in its direct line a column of seven names. Haeckel himself on page 71 talks of the *archiprimas* as "the single hypothetical root-form of the primates." Thus on his own acknowledgment it is not known to exist. But on page 77 he says that "the morphological chain is now uninterrupted and clear." Of this uninterrupted chain we regret to say that only two links out of seven are realities—five being fictions, including the very root-link of the whole chain. We give here a copy of the main line in two columns as before, for sake of comparison :—

The Primates.

HAECKEL'S TREE	THE REAL MEMBERS.
Homo sapiens	Homo sapiens
Homo stupidus	
Pithecanthropus alalus	
Prothylobates atavus	
Archipithecus Simiae	
Necrolemures	Necrolemures
Lemuravida Pachylemures	Lemuravida Pachylemures
Archiprimas Prochoriata	

Yet on page 72 Haeckel says there is "no longer any doubt that man is really a descendant of the ape...the proofs of it are exceptionally clear and simple." This

is the method of arguing described and censured by Roux [See Part III No. 5]; namely, of first filling in missing-links conjecturally by *deduction*, and then arguing about them as if they furnished proofs for *induction*. Not only is the tree, as presented without explanation, misleading to the ordinary reader; but the use of it in the text is so fallacious as to amount to a fraud.

We may remark in conclusion that, even viewed as hypothetical constructions, Haeckel's trees have not found favour among scientists. Thus for instance Stratz observes (*Natural History of Man*, p. 47):—"If we tried to construct a hypothetical pedigree on a palæontological basis, it could not turn out either so detailed or so indubitable as the one built up by Haeckel." Haeckel himself tells us pathetically how "the dominant school of anthropology, especially in Germany, . . . described our carefully prepared ancestral trees as mere figments" (*Last Words*, p. 56).

PART VII.

REPRINTS CONCLUDED; FINAL VERDICT.

In this final section we complete The examination of Haeckel's *Last Words on Evolution*, and then proceed to our final verdict on the whole case.

III. MAMMAL EMBRYOS.

Opposite page 96 of the *Last Words* we come across some familiar friends: the plate showing nine embryos of the bat, the gibbon and of man which met with so condemnatory a handling from Keibel [See Part I]. Some of the figures are mere products of fancy; others have been mutilated by the omissions of essential parts.

All this has the effect of producing an apparent identity between objects which in nature are obviously different;—thus giving fictitious support to the theory of their genetic relationship.

In this connection we must mention that H. Schmidt, Haeckel's chief champion, is obliged to confess that Haeckel had really taken Keibel's *Macaque*-embryos, changed them so as to suit his purpose, and labelled them *Gibbon*-embryos instead. Schmidt makes a lame attempt to represent this as a harmless manipulation; but goes on to acknowledge that "Haeckel has been guilty of a fault in not expressly and in every case marking the figures as schematised or reconstructed" (*Haeckels Embryonenbilder*, p. 89). The booklet containing this admission was published in April 1909. Being the work of Haeckel's own private secretary, it counts as a more or less "official" statement of the monist side of the dispute, and could hardly be unknown to those concerned with the publication of Haeckel's works. [It is expressly referred to in our correspondent's letter (See Part IV)]. The R. P. A. reprint of the *Last Words*, containing the false plate, appeared a year later than Schmidt's acknowledgment of its faultiness. And yet not a single word is given, either on the plate or in its explanation, to caution the reader against its defects. The inscription "Embryos of three mammals (bat, gibbon and man) at three corresponding stages of development" conveys the inevitable impression that the objects represented have actually been observed as they stand—instead of telling us, in plain, honest terms, that some of the most important and telling figures among them are deliberate and openly acknowledged fakes (See Schmidt's words quoted above).

IV. ANTHROPOID APES.

On page 65 of the *Last Words* we find a picture of five skeletons in a row—gibbon, orang, chimpanzee, gorilla

and man. And yet the whole plate is headed "Skeletons of five Anthropoid Apes"—thereby embodying Haeckel's favourite contention that man is a true ape. This is dead against the systematic usage in zoology. None of the great systemisers, e. g., Kennel, Claus, Carus, Ludwig or others, place man as *one* of the apes, although he is classed *with* the apes under the name of "primates." [On this point see Appendix].

On page 72 Haeckel writes: "When Huxley published his powerful essay on *Man's Place in Nature* in 1863, he gave it a frontispiece showing the skeletons of man and the four living anthropoid apes—the Asiatic orang and gibbon, and the African chimpanzee and gorilla. Plate II in the present work differs from this in giving two young specimens of the orang and chimpanzee, and raising their size to correspond with the other three skeletons." . . . "Candid comparison of these five skeletons shows that they are not only very like each other generally, but are identical in the structure and arrangement and connection of all the parts. . . . If we make a superficial comparison of our skeletons of the anthropomorpha, we shall certainly notice a few salient differences in the size of the different parts; but these are purely quantitative . . . There are, as is well known, similar differences between human beings; their arms are sometimes long, sometimes short; the forehead may be high or low, the hair thick or thin, and so on." (*Last Words*, p. 73-74.)

It is to be noticed that in *Anthropogeny*, a scientific work, Haeckel produces Huxley's plate bodily. [See *Evolution of Man*, Vol. II, p. 260]. Here in the popular work, *Last Words on Evolution*, he acknowledges the substitution of two new figures, but leaves the reader under the impression that the other three are those of Huxley. In point of fact, they are enormously changed. Any reader who likes to compare the two drawings will

be struck with the differences both in general appearance and in many details. To facilitate this comparison we have reproduced them both on the same scale in Plate II.

Thus, Huxley's figures are of different heights, while Haeckel's are all the same height. He has drawn them to widely different scales, in order to make them look more alike. Huxley's row gives the impression of a rather heterogeneous set of beings ; while Haeckel's row gives the impression of a *progressive sequence*. See the regular decrease in the length of the arms, and the regular advance from a bent to an upright posture. Huxley's apes are shown more or less correctly walking on the outer edges of their hind extremities, while man alone walks with flat feet; Haeckel's apes all walk on the flat sole as man does. Notice particularly the gorilla next to man. Huxley's specimen is bent deeply forwards, with his head down ; and the long neural spines at the back of the neck make an upright posture impossible. Haeckel's specimen, on the contrary, stands almost as upright as man ; and the bones in the neck have been rounded off so as to make an upright posture possible.

The effect of these changes is to give manifest support to Haeckel's assertion in the text : *viz.*, that the salient differences are merely "differences of size" . . . "purely quantitative" [Quoted above]. This statement is altogether contrary to the fact. Any zoological textbook comparing the skeletons of man and ape will give clear evidence that there are important differences of structure also : *e. g.*, the build of the hind extremities, certain peculiar differences connected with the upright posture and gait of man, etc.

Thus H. Obermaier in his great work already mentioned (See Part III) says, on p. 369 :—"If we coeui to comparing man, morphologically, with the animal world, the temptation arises to associate modern man

with the now living apes, and especially the anthro-poids. The gulf between the two groups is however so great that now-a-days no serious investigator thinks of asserting any very close connection between them."

(2) J. Ranke in *Der Mensch* devotes nearly a hundred pages to the detailed discussion of the numerous structural differences between man and the higher apes, beginning with the more obvious outward ones which are "visible at first sight," and concluding with the inner skeletal dissimilarities such as occur in the cranium, the extremities, etc. (See Vol. I. p. 437 sq.; Vol. II. p. 3 sq., and p. 203 sq.)

(3) O. Walkhoff in *Studies on the Evolutionary Mechanics of the Primatial Skeleton* (*Biologisches Centralblatt* 1905, No. 6, p. 182 sq.) makes the following statement:—"The fundamental difference goes so far that one can analytically ascertain from any X-ray photograph of a frontal section, or even of an entire portion of bone, whether it comes from man or from a monkey."

Surely these are differences which it is impossible to call merely "differences of size," or, "purely quantitative." There is no doubt a general similarity in the build of the bodily frame of man and monkey; but despite this it remains true what Brehm wrote fifty years ago in his standard work *Animal Life* (Hildburghausen 1864, Vol. I. p. 2):—"One single look at the skeletons of man and monkey reveals the differences existing even in their general construction." These differences are clearly shown in Huxley's original plate, but wilfully obliterated in that of Haeckel.

It seems clear that Haeckel has studiously worked out this plate to give a better support to his theory than that given by Huxley's plate. To the confiding reader the impression would be irresistible. Brass in his exposure of Haeckel (See *Ape-problem*, p. 8) calls it "boldly

garbled, and a wilful falsification of Huxley's plate." It is, in short, as bad a bit of trifling with the facts of nature as one could well imagine. It pronounces Haeckel an incorrigible sinner in his old age; a man in whom the scientific instinct has been entirely buried under the incubus of a preconceived theory. The plate is not only a disgrace to Haeckel, but a disgrace to any person who makes himself responsible for reproducing it, without appending a caution against its misleading character.

Hence the latest work published by Haeckel, and reproduced most recently by the Rationalist Press Association, is by far the worst of the whole lot. Even putting aside everything else, the charge of "shameless frauds and forgeries" against Haeckel, and the patronage and circulation of the same by the R. P. A. would stand proved to the hilt by an examination of this volume alone; and that in so obvious a manner as to be palpable even to the much-despised "man of the street," when once the facts are pointed out to him.

(4) In conclusion we may briefly refer to a short para on p. 93-94 in which the "Monera" are mentioned, and the chief false statement regarding them repeated—in particular, that "the whole living body" of them "is merely a homogeneous particle of plasm." We have already discussed the monera question when dealing with the *Evolution of Man*.

SUMMARY OF RESULTS.

Collecting briefly the results of our examination, we get the following:—

Riddle of the Universe:—

(1) Likeness of embryos falsely asserted, and supported by reference to falsified plates in other works, especially in the *Anthropogeny*.

(2) Vesicular character of *allantois* falsely asserted, and supported by reference to falsified picture in the *Anthropogeny*.

(3) Continuity of genealogical trees falsely asserted as historical and scientific fact, while many of the members are pure inventions.

The Evolution of Man :—

(1) Likeness of embryos falsely asserted, and supported by reference to falsified plates in the full editions of the same work.

(2) Picture of human embryo falsely containing a vesicular *allantois*, and argument based on the same.

(3) Likeness of sandal-shaped embryo falsely asserted—resting on a falsified plate in the complete work.

(4) Pictures of apes standing erect, omitting the caution that they are “unnaturally stretched.”

(5) The whole treatment of the “monera” shown to be false to fact, and highly misleading in the conclusions drawn from them.

In other R. P. A. Reprints by Clodd and Hird :—

(1) One of the plates falsely showing likeness of embryos, borrowed from the *Anthropogeny*.

(2) Six other embryo-figures borrowed from the same work.

Last Words on Evolution :—

(1) Two false statements about the completeness of man's line of descent, supported by genealogical trees which are full of inventions.

(2) One of the falsified plates of embryos, taken from the *Problem of Man*, and occurring even in the latest German edition of *Anthropogeny* (Plates XI and XIII).

(3) An utterly falsified presentment of four apes as compared with man.

(4) Repetition of false statements regarding the "Monera."

COMING TO A CONCLUSION.

Such is our present indictment of the R. P. A. reprints of Haeckel. Possibly a closer search might add further instances; but these will suffice for our purpose. We have confined ourselves simply to the forged plates, and those passages in the text which spring out of them or derive support from them—taking only clear and indisputable cases. We have said nothing of Haeckel's other faults scattered throughout his books—his many misstatements of fact; his many theories built illegitimately even on sound facts; his many gratuitous assumptions; his many fallacious jumps between premise and conclusion; his frequent *suppressiones veri*, by the omission of points which make all the difference and which, as Newman once remarked, "make half-truths the worst of lies": his frequent *suggestiones falsi*, which, by insinuations short of definite assertion, create a wrong impression on the mind of the reader; his attempts to claim the support of authorities who really afford no support; his attempts to rule out of court, by ridicule or other foul means, those who are frankly against him; the dogmatic emphasis with which he asserts that science has exploded all religious belief; and finally, the grotesque light in which he has represented religious beliefs in order to refute them more easily, or even to render refutation needless.

This programme it is our intention to work out at leisure on the earliest possible occasion. The result, we can foresee, will be an indictment against Haeckel far more damaging than anything we have hitherto written against him; and in consequence, a far stronger condemnation of the Rationalist Press Association for circulating Haeckel's books than anything which we have now to say against that body.

OUR FINAL VERDICT.

As the whole of the present discussion arose from THE EXAMINER article of May 23rd, we must work out our conclusions with that bone of contention before us, as well as the challenge from the Honorary Secretary of a branch of the Rationalist Press Association to which it gave rise. Turning to the letters sent to us by that gentleman, we quote from that of May 24th the following remark :—

"As regards your statement that the Rationalist Press Association propose to spread the truth among all men by the most shameless frauds and forgeries, I write to tell you that the R. P. A. have so far published about sixty works, or rather reprints of well-known writers. I challenge you to prove and to show that among any of these works there is a single instance of fraud and forgery, 'to cheat people out of their religion' as you put it."

Confining ourselves closely to Haeckel's works alone, we have fairly and squarely faced this challenge, and can now pronounce our final verdict on the result :—

According to the foregoing evidence the R. P. A. reprints, published since 1908, contain a number of Haeckel's plates which have been proved to be "shameless frauds and forgeries," together with the fictitious proofs which are built on them, or are made to appear cogent by aid of them. Therefore in answer to our correspondent's challenge, we claim to have *proved and shown* that among the various works published by the R. P. A. there occur, not only *a single instance* but several instances of *fraud and forgery*; which, since they are used for the purpose of destroying belief, may fairly be said "to cheat people out of their religion."

The only question which must remain unsettled is this: Whether the Rationalist Press Association, individually or as a body, has continued its patronage of

Haeckel's works in good faith or in bad faith ; whether its responsible authorities were fully cognisant of the Haeckel exposures, or ignorant of their clinching import. If the latter, certainly such ignorance is altogether inexcusable—considering the notoriousness of the case, and considering, also, the responsibility attached to the circulation of such literature. The Haeckel affair in all its details was so fully divulged in the German press that no one in that country could be ignorant of it. We know that people in England are as a rule profoundly out of touch with German current literature. But those who undertake an English apostolate for Haeckel ought not to be ignorant of a matter which makes all the difference to the position which Haeckel ought to hold as a teacher and guide of the people.

The question whether they have acted in good faith or bad faith we must leave to their own consciousness. But if in good faith, they cannot escape the imputation of guilt without falling under the opposite imputation of ignorance ; an ignorance inexcusable already on general grounds, but which will be all the more inexcusable after our present exposition of the whole case.

Since therefore it has been shown that the Rationalist Press Association has continued to print and sell Haeckel's books containing some of the chief frauds and forgeries of which he has been convicted, *after the exposure had become public property*, we feel bound to uphold against them the grave censure of *patronising and circulating shameless frauds and forgeries*.

APPENDIX.

AN ATTEMPT AT A REPLY.

WHILE the last pages of this reprint were just going to press, we received a pamphlet purporting to be a reply to our articles in *THE EXAMINER*.

In point of form this "reply" affects to work over our articles piece by piece. But the most essential and pointed contentions of our attack are not squarely faced; and where the author of the pamphlet has managed to say *something*, that something is generally irrelevant because it does not refute what needs to be refuted. What the author ought to have done is this:—He ought to have proved that it is lawful and honest for a scientific man to use the same identical block three times with three different labels to prove the equality of three different objects—no matter how nearly alike those objects may be; to alter illustrations of other scientists in important points, in order to make altogether different objects look very much alike, without stating that they have been so altered; to invent pictures in proof of his assertions, and present them as if they were drawn from real objects. No proof of this sort is found in the pamphlet. In place of this we find it emphasised (See pp. 19 and 22) that the first and second exposures of Haeckel's methods refer to publications brought out 46, 39 and 37 years ago—as if this made any difference to the heinous crime perpetrated therein. If Haeckel had in his later years mended his ways; if he had repented of the errors of his youth, and withdrawn them, and made a resolution never to sin again in the same way, and had kept that resolution; the antiquity of his misdemeanours might then be pleaded as an extenuating circumstance, and might have allowed us to bury

them in silence. But seeing that he has continued to carry on the same reprehensible methods of falsification, even down to his old age, and failed to profit by the various exposures to which he has been subjected ; we can only regard him as an incorrigible old sinner, whose present faults take deeper colour precisely because they are parts of a long bad record. The further back this record dates, the more manifest does his incorrigibility appear.

The author of the pamphlet lays stress on the fact that Haeckel holds four doctorates for original research, and more than seventy diplomas (p. 43). As to the doctorates for original research, we ask in what Haeckel's original research consisted. It consisted of some work in systematic zoology contained in his strictly scientific books, the value of which was fully acknowledged in *THE EXAMINER*. Suppose we add his work as a theoriser in evolution—also contained in his strictly scientific books ; this gives the full limit to Haeckel's original research. But our indictment was not against his scientific work. It was against that new form of activity which he inaugurated at a later date, when he found that his Darwinian speculations did not meet with the high appreciation he hoped for ; when, instead of confining himself to his special branch, he wandered over the whole field of science and philosophy and theology and even history, and fed the masses of humanity with such pabulum as the *Riddle of the Universe* and the *Last Words on Evolution*.

The question before us was about those works only, in which the various frauds and forgeries were practically contained ; and we venture to assert that if Haeckel still continued to receive diplomas and other honours after the publication of these popular and misleading writings, it was still Haeckel the scientist and not Haeckel the populariser that was honoured. If the

author of the pamphlet wants to prove anything against our contention, he must not merely produce evidence that Haeckel has secured a reputation for original scientific research; for this everybody knows. He must produce evidence to show that the popular works, against which our indictment is framed, have ever met with approbation or eulogy from scientific men—which certainly is not the case. So far from this, those scientific men who have undertaken to handle them have done so only to condemn them as unscientific, in the strong terms which we have quoted from so many independent critics in the course of our articles.

The practical question with which we are concerned is this:—Haeckel's *Riddle of the Universe*, *Last Words on Evolution*, etc., are being widely circulated among the general public. What are the thousands of readers to think of them? Are they to take them implicitly as sound guides to knowledge, or are they to regard them as pernicious and misleading? The answer to this question must be drawn from an examination of the works themselves, and the view which competent scientists have taken of them. The fact that Haeckel in his scientific closet has done good research work in one or other detailed branch of science, and has been honoured for that, is nothing to the point at issue.

Having remarked this much, the only further details in the pamphlet which seem to call for notice are the following:—

(1) On page 20 we read that "Professor Blösche, in his *Life of Haeckel*, explains the misunderstanding" etc. We never heard of any Professor Blösche. Perhaps it is a misprint for Bölsche, who did write a *Life of Haeckel*. But no! the spelling "Blösche" occurs again three times over on the same page and is repeated wherever else the name is mentioned in the pamphlet.

However, supposing that the author does really mean Bölsche, it may be of interest to mention that Professor Bölsche, who is evidently regarded by him as a scientific writer of weight, is not a university-professor of science at all. His title is only honorary, such as is held by many high school teachers in Germany. He has never done any scientific research in biology, and consequently his name is not mentioned in the *Zoological Address-Book* (Berlin 1911), which in its 1,110 pages gives the names of every scientific worker in the Zoologico-biological field, even of the smallest note, all over the world. He is an amateur populariser of second-hand knowledge, who devotes himself to the spread of Haeckel's ideas. Yet even so, how can Bölsche say that "certain things had been so fully established by Haeckel scientifically in other works that he was at liberty to take them as facts" in his popular writings. If those scientific works are examined it will be found that the things referred to are put forward by Haeckel in a tentative and speculative manner suitable to his rôle of scientist (see Parts V and VI of the foregoing articles); and it is only when he comes to write for the people that he bolsters up his gratuitous assertions by references to other works, on the strength of which he now makes bold to regard them as facts.

(2) On page 20 we find the three plates in the *Natural History of Creation* described as "some crude woodcuts." As we have shown (see Part I), it was not a matter of "some crude woodcuts," but of one and the same block being used three times over and labelled to stand for three different objects. The author sees in this "nothing wrong or dishonest." If so, our ideas of what is wrong and dishonest seem to differ radically.

(3) On page 33 the author draws a distinction between "inductive" and "descriptive" embryol-

ogists, and implies that Haeckel's work, being inductive, needed illustrations which descriptive embryologists did not need. This apparently means that Haeckel wanted his pictures in order to draw inductions from them. But this does not justify him in falsifying the drawings of others, or inventing others of his own, as a starting-point for induction. It is of the very essence of induction to start from observed facts, and not from fakes or inventions. In Haeckel's case the wish was father to the thought. True drawings did not furnish what he wanted, and so he had to make false ones.

(4) The author of the pamphlet lays great stress on the so-called "biogenetic law" (p. 22). As this law is a theoretical proposition merely, we had no dealings with it in our articles; but must give it some attention in this appendix. The "biogenetic law" asserts that "the development of the individual is a brief recapitulation of the development of the race." To explain concretely, this means that as man, according to the evolutionists, has gradually developed from a lower ancestry through the worm stage, the fish stage, the monkey stage, etc.; so the embryo of each man goes through these different stages, resembling in one early stage a worm-embryo, and in another early stage a fish-embryo, and then in a later stage a monkey-embryo; and the development of the individual embryo through these stages is taken as a proof that the worm, the fish, and the monkey were really ancestors of man. In our articles we dealt with the alleged resemblances between the different embryos (see Parts VI and VII). We showed that they did not exist, and that Haeckel had given an appearance of reality to them by the faking and inventing of various pictures. But here we are concerned with the law itself.

In the first place, the full credit of discovering this law is, by the author of the "Reply" (p. 22), given to Haeckel. As a matter of fact the real originator of the law is not Haeckel but Fritz Müller (See specially his *Für Darwin*; Leipzig 1864) who however does not lay it down so dogmatically as some who have followed him. All that Haeckel did was to give to this law the short epigrammatic form by which it is known to-day, and to proclaim it as if it were an ascertained and universal truth. Consequently the author of the pamphlet makes bold to say that "it is admitted by all scientists to-day."

This is entirely wrong. About thirty to forty years ago it was in high favour among many; but such men as K. E. von Baer, Rathke, Joh. Müller, and others rejected it from the very beginning. Further research has gone largely against this law. The more the individual development of different animals and plants was investigated, the more instances were there found in which the "biogenetic law" failed to show the faintest sign of its existence. Among the many recent opponents of the law are Oppel in the *Yearly Bulletin on the Progress of Anatomy and Physiology*, 1893; Keibel on the *Development of the Pig*, 1893; Steinmann in his *Prorectorial Speech*, 1899; also Haeckel's great pupil, O. Hertwig, who in *The Cell and the Tissues*, Vol. II, p. 273 (Jena 1898) says:—"When comparing ontogenetic evolutionary stages with former phylogenetic ones, we must always bear in mind that a later stage can, in reality, never again correspond to a preceding one. Ontogenetic stages give, therefore, only considerably altered representations of phylogenetic stages, such as may have once existed in former ages; but these ontogenetic stages are not identical with the phylogenetic stages as regards their true substance." Then again, Tad. Garbowski, in his *Mor-*

phogenetic Studies (Jena 1903) says with unmistakable clearness :—"Most of what is generally ascribed to the action of the so-called biogenetic law is erroneously ascribed to it ; because everything that is undeveloped and incomplete must [naturally] be more or less alike." Other well-known scientists such as Beard, Driesch, Emery, Fleischmann, Hensen, Reinke, Karl Vogt, and many more, have also expressed their disbelief in the "biogenetic law." Those who entertain the law at all do so with many reservations and restrictions. Hardly any scientist of note will be found to-day who accepts the law as it stands. The convincing reason is because recent research has clearly proved that the exceptions to this law are far more frequent than the realisations of it. The majority of the stages through which the individual embryos of different animals pass, do not for the most part correspond to the gradations which, according to the evolution theory, make up the history of the development of life.

Haeckel himself seems to have been aware of this discrepancy ; for in order to get rid of the difficulty he tried to distinguish two lines of embryonic development ; namely, *palingenesis*, which runs in agreement with the evolutionary progress of the race, and *cæno-genesis*, which consists of deviations from that line of progress (Cf. *Evolution of Man*, Vol. I, Chap. I). According to Haeckel's original text, *cæno-genesis* is a "disturbed or falsified development," tolerated by nature under the compulsion of adapting the embryonic development to different circumstances. This juggling explanation does not, however, blind us to the fact that with regard to the alleged "biogenetic law" the exceptions do not prove the rule ; for they are so numerous as rather to disprove it. A law which does not realise itself in the majority of cases cannot be called a law at all.

After those remarks it becomes clearly false for the author of the pamphlet to say that the biogenetic law is "admitted by all scientists to-day."

(5) On page 36 we are assured (against the statement of THE EXAMINER article) that "the Kepler Bund is not a Natural History Society ; few of its members are interested in Natural History." As a matter of fact, a list of the members reveals a considerable number of names well-known in the department of natural history. Moreover the paper published by the Bund is called *Die Welt* (The World) precisely because it has natural history for its scope ; and the bulk of articles it contains deal with purely natural history—thus showing where the interest of the members lies.

(6) On page 41, referring to Haeckel's plate of skeletons, we are told that the heading "Skeletons of five anthropoid apes" (Cf. our Part VII No. IV.) is not the work of Haeckel. "The mistake was inadvertently made by Mr. McCabe, the translator, who acknowledged it in the *Literary Guide* of March 1, 1911." We have not Haeckel's original plate to refer to, but take the statement as correct. We would only remark that, considering that the names "Gibbon, Orang, Chimpanzee, Gorilla and *Man*" appear in English print under the five figures, it seems a strange mistake to be made inadvertently, especially by "a most learned and scientific man" like Mr. McCabe. How is it possible that he "inadvertently" repeats the very same mistake *twice* on p. 50 of *Last Words on Evolution*, where we read :—"Explanation of Plate II ; Skeletons of *five* Anthropoid Apes. These skeletons of the *five* living genera of anthropomorpha....."—And all this done "inadvertently" by one who claims to be a zoologist ! However, to err is human ; to forgive divine.

(7) On page 27 we read that "the Kepler Bund and the *Jesuit Thomas League* began to sharpen their pen and their tongue." The Kepler Bund we know; and the Jesuit order we know; but, *Jesuit Thomas League*! who art thou? Here we recognise the old familiar clerical bogey cropping up again.

(8) We are in cordial agreement with the writer in one important point. He says on page 19:—"One would suppose that a clever and shrewd scientist like Prof. Haeckel knew what he was about." Decidedly so. It is just this "knowing what he was about" which deprives Haeckel of all plea of ignorance or good faith, and justifies our charge against his honesty.

These are the only points which it occurs to us to make any comment on. If any one takes the matter seriously enough to think it worth while weighing the value of the "reply" we suggest that, after reading its various paragraphs dealing with THE EXAMINER articles, he should merely read over again what we have there put down and have reproduced in the foregoing pages. Throughout he will find a perfectly clear issue, submitted to a perfectly clear and fully documented treatment which, if squarely faced, leaves no escape from the conclusion that Haeckel has been guilty of perpetrating, and the R. P. A. of circulating, *shameless frauds and forgeries*.

[THE END.]

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